



# Imperial Bureau of Plant Breeding and Genetics

## Plant Breeding Abstracts

Vol. IX, No. 3.

(Abstracts Nos 898—1252)

School of Agriculture  
Cambridge  
England

1st July, 1939



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\* General studies, see also individual crops.



# Plant Breeding Abstracts.

## Vol. IX, No. 3.

### Part 1. Empire Section

#### STATISTICS 519

898. FISHER, R. A. 519.24:007  
"Student."

Ann. Eugen., Lond. 1939 : 9 : 1-9.

This obituary notice is commended to the attention of experimentalists for the clear statements made as to the nature of the statistical methods based on the  $t$ -distribution, and associated with the name of "Student". The author further discusses certain inferences which can be drawn with respect to a sample of any number,  $n$ , of observations. He finds the probability that the median shall exceed  $r$  of these and be less than  $n-r$ , and also the probabilities that the hypothetical value which exceeds a given fraction of the population sampled is less than all the observed values, exceeds one of them, exceeds two, or finally, exceeds them all. The method is extended to yield the simultaneous fiducial distribution of two or more such hypothetical percentile values. J. W.

899. SAVUR, S. R. 519.24:631.421  
A note on the arrangement of incomplete blocks, when  $k = 3$  and  $\lambda = 1$ .

Ann. Eugen., Lond. 1939 : 9 : 45-49.

The author discusses the problem of arranging a number,  $v$ , of varieties in incomplete blocks under the restrictions that the varieties are to be arranged in sets of three, and that each pair of varieties is chosen once. He shows that from any solution for  $v$  a solution for  $2v + 1$  can be obtained. J. W.

900. STEVENS, W. L. 519.24:631.421  
The completely orthogonalized Latin square.  
Ann. Eugen., Lond. 1939 : 9 : 82-93.

The author discusses the completely orthogonalized Latin square in some detail, stating that the general problem to be solved is the determination of the size of the largest set of orthogonal squares of given number of rows or columns. He proves that there exist  $p^n - 1$  mutually orthogonal Latin squares of side  $p^n$ , where  $p$  is any prime and  $n$  any integer. J. W.

#### BREEDING 575

901. BURNS, W. 575:633(54)  
The progress of agricultural science in India during the past twenty-five years.

Misc. Bull. Imp. Coun. Agric. Res., Delhi 1939 : No. 26 : Pp. 49.

The survey covers, among other topics, breeding work on cotton, wheat, rice, millets, oil-seeds, sugar cane and certain other crops, accounts of which have been given from time to time in "Plant Breeding Abstracts".

902. 575:633:575.125  
BELL, G. D. H. 581.143.26.03:633  
Crops and plant breeding.

J. R. Agric. Soc. 1938 : 99 : 115-63.

This paper includes reviews of recent breeding work on potatoes, work on the nature of heterosis and its commercial exploitation, and on certain problems connected with the breeding of barley, wheat and oats. There is also a brief discussion of vernalization and a bibliography of 167 references.

## GENETICS 575.1

903. HALDANE, J. B. S. 575.115:576.12:575.14  
**The theory of the evolution of dominance.**  
 J. Genet. 1939 : 37 : 365-74.

On the basis of Fisher's theory of the evolution of dominance, it is shown that the intensity of selection for dominance must be less in an inbred than in an outbred species. Since, however, it appears that dominance is often commoner in the former, it seems that Fisher's theory must be modified.

904. FISHER, R. A. 575.116.1:519.24  
**The precision of the product formula for the estimation of linkage.**  
 Ann. Eugen., Lond. 1939 : 9 : 50-54.

Discussing the method of estimation of linkage based on the product ratio, the author derives the standard error of the estimate of  $\theta$  for the case in which differential viability is obvious in one recessive, though absent in the other. The effect of differential viability on the information obtained is examined in the cases of close linkage in repulsion; loose linkage, or independent segregation; and close linkage in coupling. J. W.

## CYTOLOGY 576.3

905. DARLINGTON, C. D. 576.312.341:576.312.381:576.356.2  
**Misdivision and the genetics of the centromere.**  
 J. Genet. 1939 : 37 : 341-64.

A new theory of the nature and behaviour of the centromere is advanced, based on observations of the irregular behaviour of univalents in *Fritillaria kamschatkensis* (? = *F. camschatcensis* Ker-Gawl.).

906. SAX, K. and  
 MATHER, K. 576.353:537.531  
**An X-ray analysis of progressive chromosome splitting.**  
 J. Genet. 1939 : 37 : 483-90.

By means of a study of X-rayed *Tradescantia* pollen, it was established that the chromosomes become effectively double at a time between 30 and 23 hours before metaphase of the first pollen grain mitosis. There was some evidence that the splitting of single chromosomes is progressive and begins at the centromere, though the data were not statistically significant. The proximal regions of chromosome arms show a higher proportion of breaks than the distal portions, a fact attributed to the greater torsional stress in the region of the centromere. Either differential stress or progressive splitting would account for the localization of crossing-over, but the latter seems to be in better agreement with the phenomenon of interference.

907. SAMPATH, S., 576.353:581.04:634.975  
 SINGH, B. N. and 576.353:581.04:635.25  
 BANSAL, R. K. 581.04:575.243  
**Effect of colchicine on plant cells.**  
 Curr. Sci. 1939 : 8 : 121-22.

The effect of colchicine treatment on mitosis was studied in *Pinus excelsa*, *Lathyrus odoratus* and *Allium Cepa*. In addition to the effects observed by earlier workers, the following phenomena were noted: (1) in *Pinus* there was a striking elongation of all the dividing cells in the radicle, (2) in *Allium* the detailed structure of the chromosomes was much more easily seen than in untreated material and (3) in *Lathyrus*, disintegration of dividing nuclei was brought about by the drug, and the respiration rate appeared to be stimulated at first and then depressed.

In the case of *Lathyrus*, it is thought possible that in suitable concentrations the drug might be employed to induce mutations.



908. BATES, G. H. 576.356.5:581.04

**Colchicine-induced polyploidy in nature.**

Nature, Lond. 1939 : 143 : p. 643.

The author failed to find naturally-occurring polyploid plants in the vicinity of colonies of *Colchicum autumnale*. He suggests that seedlings affected with colchicine would be eliminated in nature by competition with the surrounding plants, since they have a much reduced growth rate.

909. KOSTOFF, D. 576.356.5:581.04:633.1

**Induction of polyploidy by pulp and disintegrating tissues from *Colchicum*.**

Nature, Lond. 1939 : 143 : 287-88.

Swellings in the tissues of seedlings and chromosome doubling were induced in *Triticum*, *Secale* and *Crepis* by germinating seeds either (1) on pulp from *Colchicum* bulbs covered with filter paper, or (2) in sand containing *Colchicum* pulp or disintegrating pieces of *Colchicum* bulbs.

It is suggested that a search for polyploid plants among the species living in nature together with *Colchicum* would be worth while.

### PLANT DISEASES 632

910. 632.452:576.16:575.12

OLIVEIRA, B. D' 632.452:575.242:633.16

**Studies on *Puccinia anomala* Rost. I. Physiologic races on cultivated barleys.**

Ann. Appl. Biol. 1939 : 26 : 56-82.

A mutant form, differing from its parent in colour and pathogenicity, was obtained from race 14 of the fungus grown on *Hordeum vulgare* var. *pallidum* (Sudan). Segregation and hybridization of physiological races during the aecidial stage of *P. anomala* were observed, and the heterozygous condition of races 12, 13 and 23 was demonstrated. A number of new races of the fungus are described and a new selection of differential hosts proposed.

### CEREALS 633.1

911. 633.1:575(94.2)

BREAKWELL, E. J. and 633.11:575:578.08

HUTTON, E. M. 635.656:575(94.2)

**Cereal breeding and variety trials, at Roseworthy College, 1937-38.**

J. Dep. Agric., S. Aust. 1939 : 42 : 632-45.

The technique employed for wheat breeding at the College is described at considerable length. It differs from the more usual systems in that when single plant selections are made in the progeny rows in  $F_3$  and later generations, the remainder of the plants in each row are not discarded but grown on as a bulk plot or plots in the following year. In this way, by the time any line is fixed in  $F_8$  or a later generation, it has been tested in drilled plots for at least five years. The method enables baking tests to be made at an early stage and provides field performance data that enable rigid rejection of inferior material to be made in the early generations with little chance of error.

The most promising wheat selections at present in hand in various stages of breeding are described. Emphasis is placed on high yield, coupled where possible with good grain quality and disease resistance.

The oat variety trials conducted at the College are described, as also are the most important oat varieties.

With respect to barley, several selections of the cross Prior x Beaven's Special are proving very successful in field tests. The selection Prior x Roseworthy Oregon R93 has also done very well, but the new lines have as yet only been tested on a field scale in unusually bad seasons.

A number of pea crosses have been made in an effort to combine vigour with early maturity. Field trials of lines from the cross Early Dun x White Brunswick will be conducted in 1939.



## WHEAT 633.11

912. WENHOLZ, H.,  
PRIDHAM, J. T.,  
VEARS, C. K. and  
CURTEIS, W. M. 633.11:575(94)  
**Wheat varieties in Australia.**  
Agric. Gaz. N.S.W. 1938 : 49 : 583-86, 649-52 ; 1939 : 50 : 13-17, 71-74,  
p. 86, 131-35, 181-84.

This article, which is appearing in serial form, gives a brief account of the history of wheat breeding work in Australia, followed by a list of Australian wheat varieties, with details as to their origin.

913. WOODFORDE, A. H. 633.11:575(94.6)  
**The improvement of Tasmanian wheat varieties.**  
Tasm. J. Agric. 1939 : 10 : 13-18.

The unsatisfactory nature of the wheat seed stocks at present grown in Tasmania is stressed. Improvement is being effected along two main lines—by pure line selection within mixed stocks of the varieties Braemar Velvet and Major and by hybridization. A pure line selection of Braemar, No. 24, is being multiplied prior to release as an improved strain. It shows some departure from the standard Braemar type, but has consistently outyielded commercial stocks of the latter. It heads from seven to eight days earlier than the parent variety, and may prove to be suitable for spring sowing. Pure line selection within the variety Major is just being started.

With regard to hybridization, three main objectives are in view. Strains with improved yield and adaptability to Tasmanian conditions are being sought by crossing Braemar Velvet with other varieties which have done well in trials, but have not proved outstanding with regard to disease resistance.

Secondly, strains resistant to rust and other diseases are being sought, and to this end hybrids have been made between Braemar Velvet and Hope. Thirdly, improved early maturing wheats for spring sowing are desired. Attempts are being made to combine to as great an extent as possible the earliness of several spring wheats from the mainland of Australia with the high yield and tillering capacity of local wheats.

914. FRANKEL, O. H. 633.11-1.962.4-1.557:664.641.016  
**Analytical yield investigations on New Zealand wheat. IV. Blending varieties of wheat.**  
J. Agric. Sci. 1939 : 29 : 249-61.

In an endeavour to obtain a blend of Tuscan wheat with a high quality pure line which would yield as much as Tuscan and at the same time have improved baking quality, an experiment was made involving eleven lines each grown in admixture with Tuscan. In nine cases the yields of the mixture corresponded with the value calculated from the yields of the pure varieties; in the remaining two cases yields were above expectation, but not significantly so. An analysis of the yields of Tuscan, three lines and their mixed sowings showed that the component varieties of the mixtures exerted a modifying influence on each other, which was different in each of the three trials. In each case, however, Tuscan depressed the yield characters of the line with which it was mixed.

There was no evidence that the grain from the mixed plots differed in quality from mechanical mixtures of the grain of the varieties concerned.

915. NEWMAN, L. H. 633.11-2.452-1.521.6:575(71)  
**New wheat creations and their significance to Canada.**  
Canad. Geogr. J. 1939 : 18 : 208-16.

The history of wheat breeding work in Canada is traced, with special reference to the production of new rust-resistant forms. In 1939, for the first time, enough seed of these forms will be available to plant the entire spring wheat acreage of Canada. The chief varieties at present are Apex, Thatcher, Regent and Renown, the history of each of which is traced.



916. McLOUGHLIN, D. E. 633.11:664.641.016:575(68.9)  
633.11-2.452-1.521.6:575(68.9)  
**Wheat production in Southern Rhodesia.**  
Rhod. Agric. J. 1939 : 36 : 260-74.

*Inter alia*, the work done by the plant breeder in breeding new varieties which are rust resistant or of improved baking quality is discussed and the plea made that farmers should give the new varieties a trial.

## OATS 633.13

917. JOHNSON, L. P. V. and  
McLENNAN, H. A. 633.13:575.127.2:581.143.26  
**An attempt to hybridize annual and perennial *Avena* species.**  
Canad. J. Res. 1939 : 17 : Sect. C : 35-37.

Crosses between the annual *Avena* species *A. sativa* and *A. byzantina* on the one hand, and the perennial species *A. pratensis*, *A. planiculmis* and *A. pubescens* on the other, did not result in the production of hybrid seed. In one combination of *A. sativa* x *A. pratensis* and one of *A. sativa* x *A. montana* ovary stimulation was produced, but this is not taken necessarily to imply a closer relationship between the parents than that in the other crosses.

## BARLEY 633.16

918. BELL, G. D. H. 633.16:575.1"793"  
633.16:581.143.26.035.1  
**A study on the date of ear emergence in barley.**  
J. Agric. Sci. 1939 : 29 : 175-228.

A study of the date of ear emergence of barley varieties grown in several seasons and sown at various dates indicated that the expression of the character was strongly influenced by environmental conditions. It is therefore desirable that any genetic analysis of the character should be accompanied by a physiological study which would lead to a proper understanding of the effect of environment.

A series of crosses between varieties differing in time of ear emergence was studied. In one cross involving similar types there was no evidence of segregation or any large genetic difference between the parents. In two crosses involving parents of similar general type, but having a larger difference between them, there was evidence for the segregation of a single major factor giving a 3 : 1 ratio with earliness dominant. This was supported in the  $F_3$ , where a 1 : 2 : 1 ratio could be established and more of the earliest and latest rows than of the intermediate rows were homozygous. In other crosses between different physiological types the results were complex and transgressive segregation was found. There was, however, a general dominance of earliness. Some of these crosses gave what appeared superficially to be 3 : 1 ratios in  $F_2$ , but the behaviour of the  $F_3$  and the presence of transgression showed that the real relationship was more complicated.

Two crosses involving different physiological types were studied in  $F_1$  and  $F_2$  when sown at different times in the spring by dividing the progenies into several portions. The time of sowing materially affected their behaviour.

919. ANDERSON, J. A.,  
AYRE, C. A. and  
MEREDITH, W. O. S. 633.16:581.192:663.421:519.24  
**Varietal differences in barleys and malts. V. Wort nitrogen and malt extract and their correlations with barley nitrogen fractions.**  
Canad. J. Res. 1939 : 17 : Sect. 3 : 25-34.

A continuation of the authors' studies on the correlations between grain characters in samples of barley and characters of the malt derived from them (Cf. "Plant Breeding Abstracts", Vol. IX, Abst. 573).



## MILLETS AND SORGHUMS 633.17

920. RANGASWAMI AYYANGAR, G. N. and  
PONNAIYA, B. W. X. 633.174:575.11:581.45:581.49  
**Hairiness of the midrib edges in sorghum.**  
Curr. Sci. 1939 : 8 : 115-16.

A hairy midrib character in *Sorghum* is described in detail. The inheritance of the character was studied in a variety of *S. caffrorum* and it was found to be a simple dominant to the hairless condition, the gene pair involved being denoted as  $MD_H$  (hairy) and  $MD_h$  (hairless). The factor was found to be inherited independently of the factor pair  $Xx$  for white v. dull midribs (or pithy v. juicy stalks).

921. RANGASWAMI AYYANGAR, G. N. and  
PONNAIYA, B. W. X. 633.174:575.11:581.46:581.162.5  
**The occurrence and inheritance of panicle-tip sterility in sorghum.**  
Curr. Sci. 1939 : 8 : 116-17.

A selection of a variety of *Sorghum conspicuum* obtained from Tanganyika Territory had panicles, the tips of the branches of which bore spikelets that were devoid of contents. This character was found to be a simple Mendelian recessive to normal. The authors designate the factor pair involved by the somewhat cumbersome symbols  $PA_{ts}$  (tip-sterile) and  $PA_{Ts}$  (normal).

922. RANGASWAMI AYYANGAR, G. N. and  
KUNHIKORAN NAMBIAR, A. 633.174:575.11.061.6:581.48  
**A new factor determining the tint of red and yellow grain colours in sorghum.**  
Madras Agric. J. 1938 : 26 : 465-68.

Crosses between the sorghum variety Makkattai cholam (*S. subglabrescens* var. *rubidum*), which has grains with a red colour wash, and other grain sorghums, indicate that the pericarp colour wash is determined by a single gene,  $M$ . This gene determines a red or yellow colour wash according to whether the grain base is red or yellow. In the presence of the factor  $W$  (Cf. "Plant Breeding Abstracts", Vol. IV, Abst. 310) its action is masked, and it cannot be easily noted in lines carrying the pericarp colour intensification factor,  $I$ .

## RICE 633.18

923. SALIMATH, S. S. and  
KHADILKER, T. R. 633.18:575.42(54.7)  
**Improvement of rice in the Bombay-Karnatak. Part I. Selections in the Mugad and Antersal varieties of paddy.**  
Bull. Dep. Agric., Bombay (1935) 1936 : No. 178 : Pp. 26.

Selection work on the rice varieties Mugad and Antersal has been in progress at the Mugad Rice Breeding Station since 1923. Four improved strains of Mugad and three of Antersal have been selected. The characteristics of these selections are described in detail; all of them show wide adaptation in the Mallad region of southern Bombay and are superior in yield to the unimproved forms. They show a low percentage of grain shedding. The methods adopted for producing pure seed stocks of the above varieties are outlined. Improvement in other rice varieties (e.g. Dodgya and Sanna Bhatta) has recently been undertaken, and the study of the inheritance of grain shedding in rice has also been taken up.

## HERBACEOUS FORAGE PLANTS 633.2

924. JENKIN, T. J. and  
THOMAS, P. T. 633.263:575.127.2:576.354.4  
**Interspecific and intergeneric hybrids in herbage grasses III. *Lolium loliaceum* and *Lolium rigidum*.**  
J. Genet. 1939 : 37 : 255-86.

The taxonomic problems presented by Wimmera rye-grass are discussed. The two types



used in the present study are both derived from Wimmera rye-grass samples, *L. loliaceum* Hand.-Maz. (= *L. subulatum* Vis.) and *L. rigidum* Gaud., the latter being the predominant type and the former occurring as an impurity. The two types are described in some detail. Crosses between these two types gave a good set of caryopses, the latter differing somewhat in the reciprocal crosses, but only one  $F_1$  hybrid has been obtained; this was a triploid, though both parents were diploid ( $2n = 14$ ). A few viable seeds were obtained by back-crossing the  $F_1$  to *L. rigidum*, but more from self-pollination or back-crossing to *L. loliaceum*. Plants classified as *L. rigidum* frequently showed considerable cytological instability and the *L. rigidum* male parent of the above hybrid produced giant as well as normal pollen grains; it was presumably this parent which supplied the unreduced gamete producing the triploid hybrid. The frequency of trivalents in the hybrid was that to be expected in an auto-triploid. Though inversion bridges were found in the hybrid they were also found in the *L. rigidum* material, and it is concluded that there is little structural difference between the chromosomes of the parent species. Nevertheless the latter are considered to be specifically distinct. The movements of univalents at meiosis are discussed in relation to chromosome mechanics. In an addendum it is reported that a diploid hybrid between *L. loliaceum* and *L. rigidum* was found to have failures of metaphase pairing in only 5 per cent of the pollen mother cells, thus confirming the observations on the triploid. The diploid hybrid was male-sterile, whereas the triploid produced a little pollen.

J. L. F.

925. 633.284:576.312.35:576.312.34:576.354.4  
 PARTHASARATHY, N. 633.284:576.16  
**Cytogenetical studies in Oryzeae and Phalarideae. III. Cytological studies in Phalarideae.**  
 Ann. Bot., Lond. 1939 : 3 : 43-76.

A study was made of the chromosome number and morphology and of meiotic behaviour in thirteen species involving the genera *Anthoxanthum*, *Phalaris*, *Ehrharta* and *Microlaena*. It is considered that the Phalarideae fall into two morphological groups, one comprising the genera *Phalaris*, *Hierochloë* and *Anthoxanthum* and the other *Ehrharta*, *Microlaena* and *Tetrarrhena*, the second being more closely related to the Oryzeae than the first. The phylogeny of the various genera is discussed from a cytological point of view. *Anthoxanthum odoratum* is unusual in that it exhibits segmental interchange apparently coupled with autopolyploidy.

### ROOTS AND TUBERS 633.4

926. SUTTON, E. P. F. 633.4:576.16:575(42)  
**Farm roots and their development.**  
 J. Bath W.S. Co. Soc. 1938-39 : 6th Ser. 13 : 87-93.

The chief types of mangels, swedes and turnips grown in England are described and some indication is given as to their mode of origin and development by the breeder.

### FIBRES 633.5

927. 633.51:575(54)  
 633.51-1.531.12(54)  
**Annual report of the Indian Central Cotton Committee, Bombay, for the year ending 31st August, 1938.** Bombay 1939 : Pp. 160.  
**Summary proceedings of the thirty-eighth meeting of the Indian Central Cotton Committee, Bombay, held on the 17th, 18th and 19th November, 1938.** Pp. 71.

*Inter alia*, the first report summarizes the various cotton breeding schemes in which the Committee has an interest, most of the results of which have from time to time been reviewed in "Plant Breeding Abstracts". Schemes in progress for the distribution of pure seed are also dealt with and the progress made in the introduction of improved varieties is recorded. Briefer summaries of the results of the same research schemes appear in the second report.



928.

633.51:575(62)

633.51:575.12:575.42

633.51-2.484-1.521.6:575(62)

BROWN, C. H.

**Selection and hybridization.**

Emp. Cott. Gr. Rev. 1939 : 16 : 111-14.

The kinds of result obtained from the employment of various methods of cotton improvement in Egypt are outlined.

Hybridization was first employed with the aim of combining the valuable characters of different Egyptian cottons, but in practice this has not been achieved. Instead, a wide range of new and often valuable types unlike either parent has been obtained from most crosses. The types which are likely to result from a particular cross are apparently quite unpredictable. Hybridization with cottons from other countries has not so far given rise to types of value, except for the possibility that Sakha 10 may have arisen by chance hybridization of a Sea Island and an Egyptian form.

Re-selection of established Egyptian varieties, it is considered, will give very small improvement in yield and quality, but even if only a 1 per cent improvement in an important variety were obtained, the result would be economically justified. Re-selection has the advantage that the new strain may be quietly substituted for the old without dislocating the markets.

Selection of strains of established varieties resistant to *Fusarium* wilt has led to striking results, though the resistant derivative has always differed from the susceptible stock in one or more characters other than wilt reaction. In one case, Sakha 4, the resistant form had a higher spinning value than the parent stock.

929.

633.51:575(67.61)

633.51-2.112-1.521.6:575(67.61)

**Report of the Uganda Cotton Commission, 1938.**

Entebbe 1939 : Pp. 125.

This report contains a brief summary of the cotton breeding work which has been conducted at the Serere and Bukalasa Experiment Stations, Uganda. At Serere new strains are being developed to replace the widely grown N.17 cotton and the newer strain S.G.29. Drought resistant U.4 derivatives are also being bred for use in marginal areas where N.17 does not thrive. At Bukalasa a number of apparently promising strains for Buganda are now available for multiplication.

930.

633.51:575.2:575(54)

633.18:575.2:575(54)

633.18:575.11

HUTCHINSON, J. B. and

RAMIAH, K.

**The description of crop-plant characters and their ranges of variation. I. The variability of Indian cottons. II. Variability in rice.**

Indian J. Agric. Sci. 1938 : 8 : 567-91 ; 592-616.

The absence of uniformity in describing plant characters that are usually subject to a wide range of variation in the crop species under cultivation in India has been responsible for much confusion in recognising types for purposes of comparison and exchange among breeders. With a view to remedying this defect and providing a list of plant breeding material available, the Imperial Council of Agricultural Research through two sub-committees took up the survey of work done on cotton and rice in India and has published standard schedules and tables for describing plant characters.

For cotton, the important trade varieties in cultivation in India are listed under the different species and schedules for description of plant characters both quantitative and qualitative are given. Coloured charts illustrating variability of such characters as stem tip hairiness, stem colour, petal colour, fuzz colour and lint colour are furnished. Methods of computing quantitative characters like lint length, boll characters and yield are also discussed.

A specimen schedule for describing cotton strains is appended. A list of characters whose inheritance has so far been studied is also given.

For rice, the data available on the botanical and geographical distribution of the varieties and species are discussed and the necessity for a more thorough investigation on these lines for



a further understanding of the problem of the origin and evolution of the cultivated rice is pointed out.

In India, the material to be described consists of two kinds (1) strains which have attained commercial importance, evolved by the several departments of agriculture, and (2) type collections at each centre which serve as possible material for hybridization and exchange with breeders in other centres. A standard schedule for describing characters of these materials with a view to facilitating easy comparison of types grown in different centres is given. Coloured charts illustrating the ranges of variation met with in such characters as pigmentation of the different plant organs, viz. leaf sheath, internode, leaf blade, lemma, grain and pollen are given. Diagrams illustrating variability in the shape of panicle, length of glume, awns, etc., are given. Methods for evaluation of quantitative yield characters are laid down. A comprehensive list of genes and their symbolization with their modes of inheritance is also appended.

B. P. P.

931. H....., J. B. 633.51:576.16:582  
**The classification and evolution of cotton.**  
 Trop. Agriculture, Trin. 1939 : 16 : 82-83.

A reprint in a condensed form of the paper summarized in "Plant Breeding Abstracts", Vol. VIII, Abst. 341. There is one change in substance; the author no longer gives *G. religiosum* specific rank, but includes it in *G. hirsutum* as two varieties, *religiosum* and *purpurascens*.

932. GANESHAN, D. 633.51:576.312:578.6  
**Aceto-carminic smear technique for cotton cytology.**  
 Curr. Sci. 1939 : 8 : 114-15.

An account of an improved aceto-carminic smear technique which has given excellent results for cotton.

933. 633.51:677.1  
 SAWHNEY, K. 633.51:575(54.9)  
**Spinning tests with new strains of Hyderabad-Gaorani (*Gossypium indicum* Lamk.). Cotton grown in successive seasons or in different localities.**  
 Indian Cent. Cott. Comm., 1st Conf. Sci. Res. Wkrs Cott. India, Bombay (1937) 1938 : 195-203.

Evidence is presented which indicates that the selection Gaorani 6 is of higher spinning quality than local Hyderabad Gaorani. It has already been shown that the new strain has a greater yield, and higher ginning out turn than the local type and also matures earlier.

## SUGAR PLANTS 633.6

934. 633.61:575(94.3)  
 633.61.00.14

### Varietal trials, 1938 season.

Cane Gr. Quart. Bull. 1939 : 6 : 123-36.

Three new seedling sugar canes raised in North Queensland, Q.4, Q.10 and Q.12 were tested in fourteen yield trials covering a wide range of soil types. It was decided to discard the varieties Q.4 and Q.12, but Q.10 is very promising and is to be more widely planted experimentally in 1939. This variety is resistant to gumming disease in North Queensland, has a hard rind which enables it to withstand borer attack and shows distinct early-maturing tendencies. It was superior in yield to the standard variety in five trials, equal in one and inferior in eight. In respect of sugar content it was superior in nine trials and inferior in five. The behaviour of certain other varieties in the trials is also reported.

935. L....., H. M. 633.61:575.127.5:633.584.5(54.8)

**Sugar cane x bamboo hybrids.**

Int. Sug. J. 1939 : 41 : p. 95 ; also Trop. Agriculture, Trin. 1939 : 16 : p. 118.

A discussion of the work done at the Coimbatore breeding station on sugar cane x bamboo hybrids, with particular reference to the private communication of Rao Bahadur T. S. Venkatraman already reviewed in "Plant Breeding Abstracts", Vol. IX, Abst. 609.

936. JANAKI AMMAL, E. K. 633.61:576.356.5:576.16(54)

**Triplo-polyploidy in *Saccharum spontaneum* L.**

Curr. Sci. 1939 : 8 : 74-77.

*Saccharum spontaneum* is known in forms with  $2n = 48, 56, 64, 72, 80, 96$  and  $112$ . This suggests that the basic chromosome number is 8, but if that were the case the 56 and 72 chromosome forms would be  $7x$  and  $9x$  respectively and one would expect to find irregular chromosome pairing in them.

Actually, these types form bivalents regularly at meiosis, and the author concludes that the species must therefore be dibasic, having arisen from ancestral forms with  $n = 10$  and  $n = 6$ . Types with  $2n = 80$  and  $2n = 48$  are both regarded as octoploids, with a basic number of 10 and 6 respectively. Forms with  $2n = 64$  are regarded as having four sets of 6 and four sets of 10 chromosomes and are probably hybrids between the above two octoploid types. Forms with 72 and 56 chromosomes are considered to be back-cross types with  $6 \times (x = 10) + 2 \times (x = 6)$  and  $2 \times (x = 10) + 6 \times (x = 6)$  respectively. The 72-chromosome type has been synthesized by crossing 64 and 80-chromosome plants.

Among 100 seedlings obtained from a selfed 56-chromosome form, two giant plants were found which proved to be "triploids" ( $2n = 84$ ) and presumably arose by the functioning of unreduced gametes. These plants were partly sterile and univalents and multivalents were found in meiosis as well as bivalents. These "triploid" plants were intermediate in type between *S. spontaneum* and indigenous Indian cultivated sugar canes, and it is suggested that the latter may have arisen by similar "triploidy" in wild canes.

**STIMULANTS 633.7**

937. 633.71:575(54)

**Report on the marketing of tobacco in India and Burma.**

Agric. Market. India 1939 : Market. Ser. No. 10 : Pp. 503.

Included in this report is a brief account of the tobacco breeding work that has been done in India. With regard to cigarette tobacco, two selections, H.142 and H.177, made at Pusa from the cross Adcock x Pusa Type 28 proved to be heavier in yield and equal in quality to Adcock. Breeding work conducted at the Nadiad tobacco farm included a cross between the local, high-yielding Gandiu variety and Adcock, from which forms reported to be suitable for the manufacture of lower quality cigarettes were obtained. Hybridization experiments are also being made at the Agricultural Research Station at Guntur. Since 1936 a co-ordinated scheme of tobacco research has been in progress in India and it is hoped to take up the work of breeding new types on a larger scale.

Work on the improvement of yield and quality in the coarser Indian tobaccos has been carried out only at the Nadiad tobacco farm, where extensive selection work has been done on local "bidi" tobacco. Three selections of superior yield, G.6, P.45 and P.28 have been released and of these G.6 is particularly popular as its cultivation involves less labour than the local types. It is suggested that similar breeding work should be conducted in other areas. The arrangements existing for the distribution of tobacco seed in India are reviewed.

938. 633.71:575.127.2:581.192.6

KOSTOFF, D.

633.71:576.356.5

**Nicotine and citric acid content in the progeny of the allopolyploid hybrid *Nicotiana rustica* L. x *N. glauca* Grah.**

Curr. Sci. 1939 : 8 : 59-62 ; also C.R. (Doklady) Acad. Sci. U.R.S.S. 1939 : 22 : 121-23.

Details are given of the nicotine, anabasine and citric acid contents of a number of plants



of the fourth generation of amphidiploid *Nicotiana rustica* x *N. glauca*. These plants showed great variation in vegetative and other characters, which is attributed to crossing-over between *N. rustica* and *N. glauca* chromosomes following multivalent formation.

The *N. rustica* plant contained nicotine but no anabasine, whereas the reverse was true of the *N. glauca* parent. The amphidiploid plants, like other similar *Nicotiana* hybrids studied, contained only anabasine, with the exception of one plant which also contained a small amount of nicotine. The citric acid content of these plants varied from 1.3 to 5.0 per cent, the corresponding figures for the parents being 5.6 per cent for *N. rustica* and 3.0 per cent for *N. glauca*.

The anabasine content of some of the allopolyploid plants (1.3 to 2 per cent) was considerably higher than in the *N. glauca* parent, where it was 0.84 per cent. It is considered that, with further breeding work, lines may be isolated which may become economically important sources of anabasine. There are indications that the polyploid plants are more frost resistant than the parent forms.

Preliminary results are given of the nicotine, anabasine and citric acid contents of (*N. rustica* x *N. glauca*) F<sub>1</sub> x *N. rustica* back-cross derivatives, further details of which are found in the paper by N. I. Žukov summarized in Abst. 1141 below.

939. PAL, B. P. 633.71:575.14:631.531.12(54.8)  
**A brief note on the seed supply of Virginia tobacco.**  
 Agric. Live-Stk India 1939 : 9 : 42-43.

An experiment has been begun at the Tobacco Research Sub-station at Guntur to determine whether repeated self-fertilization in tobacco has any deleterious effect on the crop. Selfed lines of the variety Harrison's Special will be compared with stocks grown from freshly imported American seed. If it can be demonstrated that selfing does not lead to deterioration, it should be possible to produce locally all the seed required by the Indian cigarette tobacco industry.

940. KOSTOFF, D. 633.71:576.16:576.356.5  
 633.71:575.127.2  
**The origin of the tetraploid *Nicotiana* from Bathurst.**  
 Curr. Sci. 1939 : 8 : 110-12.

Morphological and cytogenetic evidence is presented which indicates that in all probability a wild tetraploid ( $n = 32$ ) tobacco species obtained from New South Wales arose as an allopolyploid from *N. maritima* ( $n = 16$ ) and *N. suaveolens* ( $n = 16$ ). The author gives the name *N. Eastii* to the new form.

*N. Eastii* usually forms 32 bivalents at meiosis, but occasionally one quadrivalent or a trivalent and a univalent were found. When crossed with *N. Sanderae* ( $n = 9$ ) the F<sub>1</sub> usually formed 16 bivalents and 9 univalents, from which it is concluded that the 9 *N. Sanderae* chromosomes remain unpaired and the two chromosome sets of *N. Eastii* pair with each other. This is in accordance with the supposed ancestry of the species, since F<sub>1</sub> hybrids of *N. maritima* and *N. suaveolens* show an almost normal meiosis.

Chromatin bridges were observed at anaphase in the *N. Eastii* x *N. Sanderae* hybrid.

941. 633.71-2.8-1.521.6:575.127.2  
**Tobacco mosaic.**  
 Rhod. Agric. J. 1939 : 36 : 172-73.

An editorial referring briefly to the work of F. O. Holmes in breeding mosaic-resistant tobacco strains (Cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 915; IX, 386).

942. S....., R. L. 633.73:575(92.2)  
**Notes on a visit to some Java Experimental Stations.**  
 Mon. Bull. Coffee Bd Kenya 1939 : 5 : 44-45.

The history of coffee cultivation in Java and the aims of present-day breeding work are briefly outlined.

943. GILBERT, S. M. 633.73:575.42(67.8)  
**Selection within *Coffea arabica* in Tanganyika Territory.**  
 E. Afr. Agric. J. 1939 : 4 : 249-53.

T....., A. S.  
**Coffee selection.**

E. Afr. Agric. J. 1939 : 4 : 241-43.

Individual yield records are being made on 20,000 trees in thirty blocks spread throughout all coffee districts of the Territory. A list is given of the best fifty-five potential selections based on the results of four years' yield recording. The minimum standard for selection is 8.5 kg. of cherry, on the average, per annum, due weight being given to particularly favourable environmental conditions which may increase the yield of a given tree.

In addition to yield recording, a random sample of beans (350 is adequate) from all pickings is taken from the potential selections, and observations are made on quality both as raw coffee and in liquoring tests.

It is expected that final selections will be made in five or six years' time and in the meantime seed and suckers from promising trees are to be propagated.

The second paper is an editorial comment on the above. It is pointed out that, although good results may be expected from the type of selection indicated, it is probable that the cultivated forms of *Coffea arabica* form a very small part of the total botanical diversity of the species as found in a wild state. The possibility of obtaining outstanding new types from the progeny of wild trees is indicated.

944. F....., L. M. 633.73:581.165:575(67.5)  
**The multiplication of desirable coffee trees by cuttings.**

Quart. Notes Coffee Res. Exp. Sta. Tanganyika 1938 : No. 7 : 8-9.

Cuttings are being taken from selected trees on coffee estates in Tanganyika in order to establish superior clones. The method of vegetative propagation of these clones is described.

945. 633.73-1.547.15:575.42(67.8)  
**Quarterly notes of the Coffee Research and Experiment Station, Lyamungu, Moshi.**

Dep. Agric. Tanganyika, December 1938 : No. 8 : Pp. 12.

**Coffee research and Experimental Station, Lyamungu, Moshi.**

Mon. Bull. Coffee Bd Kenya 1939 : 5 : p. 37, 39.

*Inter alia*, a report is given of an experiment which shows that the selection of the best coffee seedlings in a nursery for planting out is well worth while, since they produce superior bushes with a yield above the average.

## OIL PLANTS 633.85

946. Ross, A. M. 633.854.78:575(71)  
 633.854.78:519.241.1:631.557  
**Some morphological characters of *Helianthus annuus* [sic] L., and their relationship to the yield of seed and oil.**  
 Sci. Agric. 1939 : 19 : 372-79.

The literature which has a bearing on the problem of breeding sunflowers for seed is reviewed. A statistical study was made of eighteen inbred strains of sunflower, and the following correlations were found to be significant: positive, percentage of oil in seed and height of plants, percentage of oil and yield of seeds, yield of seed and height of plants; negative, yield of seed and the factors for number of leaves, number of branches, number of days from sowing to blooming and number of flower heads.

It is concluded that the taller non-branching types of sunflower are the most promising as parent material for breeding strains with a high yield of oil.



## RUBBER PLANTS 633.91

947. FORD, C. E. 633.912:575  
**The principles of plant breeding and their application.**  
 4th Quart. Circ. Ceylon Rubb. Res. Scheme 1938 : **15** : 215-21.  
 A brief, popular account of elementary genetics and cytology, in relation to the breeding of *Hevea*. J. L. F.

948. MURRAY, R. K. S. 633.912-2.421.1-1.521.6:575(54.8)  
**Oidium leaf disease.**

4th Quart. Circ. Ceylon Rubb. Res. Scheme 1938 : **15** : 236-42.

A search for rubber trees resistant to *Oidium* leaf disease in 1929 and 1930 had no success, such healthy trees as were found being considered to have escaped infection.

It is hoped that the search will now be resumed under the recently appointed geneticist, and that clones will be ultimately established from resistant trees, or from crosses of resistant trees with high-yielding clones. The reported freedom from leaf disease of certain clones is to be investigated. J. L. F.

## FRUIT TREES 634

949. GILL, N. T. 634:576.16  
635:576.16  
**The origins of our garden crops.**

Gdnrs' Chron. 1939 : **105** : 57-58, 268.

After citing the views of de Candolle on the approximate length of time our major fruit and vegetable crops have been under cultivation, the author goes on to deal with the origin of each crop in turn. Brief descriptions are given of the supposed wild prototype of each crop and of its habitat and geographical distribution. The crops dealt with so far are *Brassicæ*, carrots, parsnips, celery, beet and horse-radish. The article is to be continued.

950. 634.13:575.247:576.356.5  
634.13:581.162.52  
634.13:576.354.4:576.354  
 CRANE, M. B. and  
 THOMAS, P. T.  
**Genetical studies in pears. I. The origin and behaviour of a new giant form.**

J. Genet. 1939 : **37** : 287-99.

An auto-tetraploid form of the diploid pear variety Fertility was obtained as a bud sport. In the tetraploid, the fruits were larger and broader in proportion to their length than in the diploid. The tetraploid had a higher proportion of defective pollen grains than the diploid and the good pollen grains were larger and differed in shape. Tetraploid pollen tubes were frequently branched.

The diploid Fertility pear is only slightly self-fertile, but the tetraploid showed a high degree of self-fertility. The diploid x tetraploid cross was also fertile. The reason for this increase in fertility following doubling of the chromosome number is not at present known.

In crosses between diploid Fertility and triploid pear varieties, there is evidence that either apomixis or gametic selection or a combination of both occurs.

Chromosome pairing in the diploid Fertility pear was normal except for an occasional pair of univalents and the rare formation of an inversion bridge. The chiasma frequency and the terminalization coefficients in different types of configuration were determined. It is thought probable that pachytene pairing is localized near the ends of chromosomes and near the centromeres.

Occasionally, pollen mother cells with a supernumerary large or small nucleus were observed in this material. In these cases the two nuclei behaved independently throughout meiosis. These abnormalities are due to irregular premeiotic mitoses.

In the auto-tetraploid pear, very few pollen mother cells showed any univalents, and 42.3 per cent of the total possible quadrivalents were actually formed, the remaining chromosomes forming bivalents.

The significance of bud mutation in fruit trees is briefly discussed.

951. CRANE, M. B. and BROWN, A. G. 634.22:581.162.5:576.356.5  
634.22:576.16  
**Incompatibility and sterility in the gage and dessert plums.**  
J. Pomol. 1939 : 17 : 51-66.

The compatibility relations of a large number of greengage and other dessert plum varieties are recorded. The varieties may be classified into three groups—self-incompatible, partially self-incompatible and self-compatible. In some combinations, varieties of the first two groups show cross-incompatibility. In some cases this is reciprocally expressed, but in others a particular combination of varieties may show incompatibility in one direction of crossing only. The frequency of cross-incompatibility is lower in plums than in the sweet cherries and its behaviour is more complex, a fact attributed to the hexaploid constitution of *Prunus domestica*.

In the greengage group varieties occur which are very similar in their morphological characters and incompatibility relations. It is suggested that they may be seedlings from parents recessive for several characters, or that they may have originated as bud sports.

Degrees of generational sterility occur in the dessert plums, expressed by aborted pollen and imperfectly developed or non-viable seeds. The variety Golden Esperen is completely male-sterile.

The varieties studied are listed according to time of flowering and incompatibility group, so that the grower may select suitable combinations for planting.

952. UPSHALL, W. H. and HAARLEM, J. R. van 634.25:575(71.3)  
**The "V" peaches. Distinguishing characteristics of Vimy, Vedette, Valiant, Viceroy and Veteran.**  
Bull. Ont. Dep. Agric. 1938 : No. 389 : Pp. 7.

A description of the "V" series of peach varieties bred at the Ontario Horticultural Experiment Station, including details of their origin.

### CITRUS FRUITS 634.3

953. PERLBERGER, J. and REICHERT, I. 634.3:575.061.634:631.547.15:581.04  
**Experiments on the control of albinism in citrus seedlings.**  
Bull. Agric. Res. Sta. Rehovot 1938 : No. 24 : 40-77 ; also Palest. J. Bot.  
1938 : 2 : R. Ser. : 40-78.

Varying percentages of albino seedlings were found in seed beds of the sweet lime and sour orange, 2.5 to 74 per cent in the former case and 0 to 12 per cent in the latter. It was found possible to control this albinism completely by treating the seed with various proprietary compounds containing mercury, or by dipping seeds in solutions of salts of mercury, copper, cobalt, lead or nickel. Salts of iron, zinc, manganese, magnesium, calcium, strontium and barium were ineffective.

It is considered that the tendency to albinism is an hereditary defect, due to a disturbance of the enzymatic systems of the plant at the time of seed germination. This disturbance is only manifest under certain environmental conditions (as shown by the great variation in the proportion of albinos in seed beds) and is inhibited by the presence of salts of heavy metals, which are known to have an effect upon enzymatic systems.

### SMALL BUSH FRUITS 634.7

954. CRANE, M. B. and THOMAS, P. T. 634.71:581.163:575.116.1  
**Segregation in asexual (apomictic) offspring in *Rubus*.**  
Nature, Lond. 1939 : 143 : p. 684.

Two cases are cited in which apomictic reproduction in *Rubus* is accompanied by segregation. When *R. nitidioides* ( $2n = 28$ ) is crossed with *R. thyrsiger* ( $2n = 28$ ), the offspring are of three types, sexual offspring, plants identical with the maternal parent *R. nitidioides*, and a



new type with large flowers and seven-leaflet leaves which shows no trace of the male parent. The dioecious species *R. vitifolius* ( $2n = 56$ ) when crossed with tetraploid *R. Idaeus* ( $2n = 28$ ) gives 42-chromosome offspring of sexual origin and also 56 chromosome plants of apomictic origin, identical with *R. vitifolius*. The latter, however, contain plants with male flowers and plants with female flowers, in roughly equal proportions. Since such segregation occurs in the apomictic progeny, it is concluded that the apomictic embryo arises at a stage subsequent to the first division of meiosis. These examples indicate how many of the clones and sub-clones of *Rubus* occurring in nature may have arisen.

955. 634.714:575.42:581.165  
634.715.00.14  
BEAKBANE, A. B.  
**Trials of loganberries, blackberries and hybrid berries at East Malling.**  
Sci. Hort. 1939 : 7 : 64-70.

A considerable amount of admixture of loganberry stocks with various inferior seedling types was found to have occurred in England. A plant apparently identical with the original loganberry was therefore selected and is being propagated vegetatively. A small quantity of this stock will be available for distribution in the autumn of 1939. Among other topics concerning berry production, the probable value of certain relatively little known types under English conditions is discussed. The John Innes blackberry has fruit of excellent appearance and it may prove to be a valuable garden variety. An unnamed seedling blackberry raised by Mr M. B. Crane is promising on account of its good flavour, though it does not yield such a heavy crop as the Himalaya variety.

#### OTHER FRUITS 634.77

956. 634.771:575.12:581.6(96.1)  
**The I.C.2 banana in Fiji.**  
Trop. Agriculture, Trin. 1939 : 16 : p. 89.  
A reprint of the article summarized in "Plant Breeding Abstracts", Vol. IX, Abst. 88.

#### VEGETABLES 635

957. 635.25:581.6:575(93.1)  
**Trials with onion seed. Production of improved varieties under departmental supervision.**  
N.Z. J. Agric. 1939 : 58 : 33-34.

Until recently selection of onions in New Zealand has been entirely in the hands of seedsmen, who have developed a fairly wide range of types, many of which are of poor keeping quality. The Department of Agriculture is now conducting trials of commercial strains with a view to purifying and certifying the best. This work will necessarily take a number of years, so that in the meantime élite seed of the variety Pukekohe Long-keeper, which has exceptional keeping quality and gives a high yield of good quality bulbs, is being produced under departmental supervision. Bulbs are selected each year from a crop of the variety by the Department and handed over to a commercial grower for seed production. The growing crop is inspected and rogued by numbers of the departmental staff.

958. 635.64:575.11:575.246  
CRANE, M. B.  
**"Rogues" and segregation in tomatoes.**  
Gdnrs' Chron. 1939 : 105 : 92-93, 110-11.

"Rogue" plants, which are chiefly characterized by their short stature, vigorous development of lateral growth, irregular leaf shape and low productivity, occur among the offspring of certain tomato varieties, in proportions varying from extreme rarity up to 14 per cent. The inheritance of the character in a number of progenies is discussed and the results tabulated. Rogue plants gave a maximum of 54 per cent of rogues and intermediate plants in their offspring and normal plants derived from rogues rarely gave less than 10 per cent of rogues

and often a much higher proportion. The results suggest that the character is the result of the action of unstable genes which frequently mutate in both directions. It is frequently suggested that the characters of tomato plants may differ according to the position of the fruit from which seed is saved on the parent plant. This belief seems to be based on the results of Bewley and Richards (1925) for the inheritance of the character Ailsa Craig type v. Blaby type of plant. The experiments of these authors was repeated and it was shown that a 3 : 1 segregation for the character was obtained irrespective of the position of the fruit on the parent plant. In the case of the rogue character, there is no connexion between the proportion of rogues and the position of the fruit on a normal parent plant. Rogue plants, however, frequently bear mutant branches as mutants. The seeds from these give a lower proportion of rogues than do seeds from rogue branches.

959. HATCHER, E. S. J. 635.64:575.125  
**Hybrid vigour in the tomato.**  
 Nature, Lond. 1939 : 143 : p. 523.

Embryo development was compared in a cross between two lines of tomato and artificially self-fertilized material of each parent. The hybrid embryos developed more quickly than the selfed ones in the early stages, but ultimately both reached the same size, which was determined primarily by the number of seeds in the fruit. When hybrid embryos were compared with embryos obtained by natural self-fertilization, the selfed embryos were found to be the smaller. This was due to the greater efficiency of the natural pollination, which resulted in more seeds per fruit being set, so that their individual size was reduced through competition. There was no evidence that the larger size of the hybrid embryos was due to heterosis.

960. LUCKWILL, L. C. 635.64:575.125  
**Observations on heterosis in *Lycopersicum*.**  
 J. Genet. 1939 : 37 : 421-40.

A study of heterosis involving seven inbred lines and twelve hybrids of *Lycopersicon* was made. There was found to be very little correlation between the presence of heterosis in the hybrid seed and in the mature hybrid. It appeared that the stage at which heterosis is first apparent varies considerably in different hybrids; it may appear in the embryo, in the seedling, in the young shoot, or later in the development of the plant. When once established, however, heterosis appears to persist on a relative basis until maturity. In some cases, heterosis with regard to height was found where there was no heterosis with regard to weight. In some of the hybrids between distinct dwarf types of *L. esculentum*, heterosis could be explained on the basis of Jones' hypothesis. In the interspecific hybrids, however, the hypothesis proposed by East is considered to agree more closely with the facts.

961. 635.75:581.162.3  
 PILLAI, S. M. 635.75:575(54.8)  
**Preliminary studies in coriander (*Coriandrum sativum* L.).**  
 Madras Agric. J., 1939 : 27 : 79-84.

A study of floral structure and anther dehiscence in coriander, undertaken as a preliminary to the programme of breeding work now in progress at the Agricultural Research Station at Kovilpatti, Madras.



## Part II. Foreign.

### STATISTICS 519

962. REMUSSI, C. 519.24  
Aplicación del análisis de la variancia a los ensayos comparativos de rendimiento. (**Application of the analysis of variance to comparative yield tests**).  
Rev. Argent. Agron. 1938 : 5 : 254-83.

A concise account, with examples, of the familiar statistical treatment of field experiments is given for the benefit of Spanish readers.

963. BÄR, A. L. S. 519.24:631.421  
Interpretatie van proefveld-resultaten. (**Interpretation of the results of field experiments**).

Landbouwk. Tijdschr. Wageningen 1939 : 51 : 229-46.

The author criticizes the systematic arrangements of field experiments which are still widely used, and advocates the randomized methods of "Student" and Fisher. He suggests that an agricultural investigation must begin with large field experiments, designed as factorial schemes. The second phase is to carry out smaller experiments, including 10-20 treatments. After these preliminary stages results must be obtained from well designed small experiments, excluding the less important interactions, and at this stage "Student's" method of adjustment provides satisfactory results. J. W.

964. PRZYBOROWSKI, J. and WILEŃSKI, H. 519.24:631.421  
Analiza zmienności wyników doświadczeń wielokrotnych. (**Analysis of variance of results of multiple agricultural trials**).  
Wydawnictwa Sekcji Nasiennej Przy M.T.R. w Krakowie i Zakładu Hodowli Roślin i Doświadczalnictwa U.J. 1938 : No. 20 : Pp. 19 ; supplement to Roczn. Nauk Rol. 44.

The method of the analysis of variance in taking together the results of multiple agricultural trials is described, and its use in estimating, not only the errors of the general means, but also the significance of the various interactions, is indicated. The exclusion of a few inexact experiments from the series is touched on, and a method is described for detecting systematic mistakes by introducing the same treatments more than once into the experiments. J. W.

965. HARRINGTON, J. B. 519.24:633.1-1.421  
The number of replicated small plat tests required in regional variety trials.  
J. Amer. Soc. Agron. 1939 : 31 : 287-99.

A study was made of data from several hundred Latin square tests of barley and wheat, covering the period 1935 to 1937, in order to determine the number of tests required for accurate comparative results in a given area. When a fraction only of the number of tests made were selected by a process of random sampling, and examined, it was found that varietal differences which were previously significant were no longer clearly revealed. It is concluded that in order to ascertain quickly the comparative performance of new varieties of an important crop in the different parts of a large agricultural area, literally hundreds of tests should be carried out over at least two representative years. J. W.

966. MAHONEY, C. H. and BATEN, W. D. 519.24:635.67-1.557  
The use of the analysis of covariance and its limitation in the adjustment of yields based upon stand irregularities.  
J. Agric. Res. 1939 : 58 : 317-28.

Examples are given of the application of the analysis of covariance technique in adjusting yield for stand, and measuring the improvement or otherwise of the precision of the experiment

after adjustment. One example concerns strains of sweet corn, where the method resulted in an increase of precision. Other experiments in maize, tomatoes and beans are described, in which the method is not so successful. J. W.

## BREEDING 575

967. EIKELAND, H. J. 575:633  
 Planteforedlingsarbeidet i jordbruket. (**The work of plant breeding in agriculture**).  
 Tidsskr. Norske Landbr. 1939 : 46 : 71-82.

The principles of plant breeding are briefly outlined and some of the new varieties of cereals, potatoes and forage plants are described. Finally the value of plant breeding to agriculture is pointed out.

968. 575:633  
 633.15:575.12  
 TORRES BARUSTA, G.  
 Aplicación de la genética para obtener líneas puras con caracteres determinados. (**Application of genetics to obtain pure lines with particular characters**).  
 Agricultura, Mexico 1938 : 1 : No. 8 : 3-10.

The method of combining desirable characters occurring in different varieties by the method of hybridization is illustrated by the case of maize, the two characters chosen as an illustration being earliness and yield.

969. APPEL, G. O. 575:633(43)  
 Institut für Pflanzenbau und Pflanzenzüchtung. (**Institute for plant cultivation and plant breeding**).  
 Jber. preuss. landw. VersAnst. Landsberg. 1939 : 31-38.

The results recorded in this brief annual report include a new winter barley, Peragis Strain 12 which is winter-hardy and of good yield and standing capacity.

A new variety, "Morgenrot aus Halle" appears to answer the demand for a spring barley which ripens as early as the winter barleys. It falls not far behind Isaria in yield but though it ripens about eleven days before Isaria it is still about a week later than the winter barley. A new winter-hardy strain of winter wheat, strain 192 from Crievenner, is satisfactory in yield and straw stiffness and will replace the older No. 104. A world collection of maize has been assembled as well as the collection from the Hindu Kush expedition. A variety of maize with a fat content in the grain of up to 9 per cent is of interest. From crosses of a very early but small and short stemmed maize with an early German variety, a strain has been obtained which ripens probably in the middle of August.

Experiments are also being made with millets and sorghums, sunflowers, leguminous plants, rape and forage plants.

970. 575:633(47)  
 (**On what are the breeding stations working ?**)

Selektsija i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 11 : p. 38.

The work of the Mironov Station includes the breeding of new varieties of winter wheat, oats, millet, etc. for increased yields. The winter wheat 0201 surpasses Ukrainka in yield and resistance to rust and smut, and is also resistant to lodging.

The oat strain 01363 gives a high yield of good quality grain with a low husk percentage and is resistant to lodging and rust.

In 1939 the Station intends to breed lentils.

The Kazan Breeding Station is conducting experiments on various cereals, potatoes, etc.

The Albidum strains of spring wheat Nos 04749, 04815 and 04649 have proved superior to Lutescens 062 in yield and quality. Elite forms of Lutescens 062 are being obtained by intra-varietal crossing.



Winter wheats produced by the Kazan Station are *Erythrospermum* 01630 and *Ferrugineum* 02055, both of which have surpassed *Lutescens* 0329 in yield; *Ferrugineum* 02055 was also more winter-hardy.

The Avant-garde variety of rye which was also bred at the Kazan Station has recently been surpassed in yield by Kazan 5 + 6.

Among the vetches produced, two strains Nos 0521 and 258 are remarkable for drought resistance and absence of shedding, while the variety Gigant is exceptionally winter-hardy. The pea strains 0104 and 04 are earlier and larger seeded than the standard variety Kapital.

971. 575:633(47)  
 FRENKEL', A. I. 633-1.531.12(47)  
 (The achievements and immediate problems of Soviet breeding).  
 Seleksijsa i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 11 :  
 8-10.

An outline of reforms in plant breeding and seed production in the U.S.S.R. since the revolution, with observations on some of the successful work that has been done by Lysenko and Tzitzin. A more extended use of local wheats in breeding work is urged.

972. 575:633(47)  
 KORNJAKOV, D. G.  
 (The work of the Saratov breeding station in 1938).  
 Seleksijsa i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 12 :  
 30-31.

Among the new productions of the Saratov Station referred to there appears a new winter rye Saratovskaja No. 1, superior to Eliseevskaja in yield and grain quality.

Summer planting of potatoes and intravarietal crossing in wheat have been introduced, the importance of soil fertility for the quality of the ensuing generations is receiving attention, the number of hybridizations made is being greatly curtailed and future work is to be based on the doctrines of Darwin, Michurin and Lysenko.

973. 575:633(47)  
 MIKHAILOVSKII, V.  
 (The work of the Voroshilovsk official breeding station).  
 Seleksijsa i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 12 :  
 32-33.

The method of producing the seeds of varieties designed for each of the three climatic zones served by the Station in the zone itself, according to the principles of Lysenko, is being applied. The varieties are subjected to intravarietal crossing and rigorous selection under intensive conditions of cultivation.

Crosses have also been made between the local wheats and imported American varieties, whereby forms of increased resistance to yellow and brown rust and of improved yield have been obtained.

Experiments are also being made on the production of perennial wheats by crossing wheats with perennial rye, and of perennial forms of other crops.

974. 575:633(47)  
 ORLOV, P. G.  
 (Achievements of Soviet agronomy and breeding).  
 Seleksijsa i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 11 :  
 11-13.

An article on Russia's achievements in agronomy and plant breeding, including work on drought resistance and vernalization and hybridization of distantly related forms of cereals.

975. 575:633(49.2)  
 Vijftiende beschrijvende rassenlijst, opgemaakt ingevolge de beschikking van den Minister van Binnenlandsche Zaken en Landbouw van 21 October 1924, gewijzigd 28 Maart 1933. (**15th descriptive list of varieties, drawn up in pursuance of the Order of the Minister of Internal Affairs and Agriculture of the 21st October, 1924, amended 28th March, 1933**).

Inst. Plantenveredling, Wageningen 1939 : Pp. 232.

The current issue of this extremely useful and well arranged annual publication by the Wageningen Institute for Plant Breeding. For a full review of its scope see "Plant Breeding Abstracts", Vol. VIII, Abst. 1090.

976. 575:633-1.525  
 GIŻBERTÓWNA, W.  
 Udział hodowli w aklimatyzacji roślin. (**The role of breeding in plant acclimatization**).  
 Życie Rolnicze 1939 : 4 : No. 4 : 14-16.

Reference is made to the role played by selection of ecotypes, varying in certain special directions, in the successful acclimatization of new plants. This can be further supplemented by the method of crossing with local forms already possessed of the necessary adaptation. Examples of successful acclimatization by the use of genetical methods are cited: e.g. in Germany the introduction of the soya bean and the improvement of the lupin by importing material from the Mediterranean, and in the Soviet Union the introduction of blight resistant potatoes from the new world, and the various new rubber-bearing plants. The best of these have been shown by Polish experiments to be *Taraxacum kok-saghyz* and as the rubber content varies from plant to plant there is definite scope here for further selection work. Among the results of chromosome duplication by colchicine treatment the most promising from the present point of view are the conversion of annual forms into perennial and the production of forms of increased winter-hardiness.

## GENETICS 575.1

977. 575.125:575.14  
 KARP, M. L.  
**The influence of intrachromosomal and interchromosomal relations upon the results of inbreeding and crossing.**  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 340-44.

An account of some inbreeding experiments on *Drosophila melanogaster* from which certain general conclusions as to the nature of heterosis are drawn. The American breeding work on maize is briefly discussed.

978. 575.127  
 KOSTOFF, D.  
**(Present status of the researches upon interspecific hybridization in plants).**  
 Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 565-96.

A historical review is given of the work on distant hybridization from the time of Kölreuter to the present day; the various factors influencing crossing capacity are discussed, with examples, and the desirability of obtaining further insight into the processes governing pollen and zygote viability in different crosses is emphasized. Reference is made to the successful use of a third bridging species in combining two species that do not intercross, illustrated by the example of several *Nicotiana* crosses and the successful combination of *Secale cereale* with *Haynaldia villosa* by the use of *Triticum dicoccum* which was first crossed with *H. villosa* and the hybrid crossed with *S. cereale*. The successful use of mixtures of pollen of different varieties in performing difficult crosses is mentioned; also the influence of chromosome duplication, grafting, etc.

The various types of  $F_1$  hybrid known in distant crosses are enumerated, followed by the various methods for overcoming their sterility, after which the possibilities of obtaining



recombination of characters, and the factors controlling it, are discussed; also the tendency towards mutation, polyploidy and other chromosomal irregularities in distant hybrids.

There follows a discussion of the role of wide crossing in plant phylogeny and in plant industry; figures illustrating the frequency of distant hybrids in nature are quoted, together with instances of existing species known to have arisen as amphidiploids or occasionally partial amphidiploids; the influence of wide crossing in stimulating mutation and other evolutionary changes is also stressed.

All processes that are of evolutionary significance are of equal importance in breeding and distant hybridization is no exception. The difficulties associated with its application, especially to plants propagated by seed, are however emphasized and breeders are advised not to resort to the method in the absence of adequate facilities or if the characters desired are obtainable within the species. The problem is a complex one and can only be adequately solved by the co-operation of geneticists and cytologists with specialists in the allied sciences of physiology, biochemistry, biophysics and immunology.

979.

VAVILOV, N. I.

575.127:575:633

575.127:576.12

(Significance of distant hybridization in breeding and evolution).

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 543-63.

In tracing the development of wide crossing as a practical breeding method the author refers to the work of Burbank and Michurin, the Java sugar cane breeding, the Coimbatore cane-sorghum hybrids, the Russian sunflower-artichoke crosses and interspecific potato hybrids, and numerous interspecific hybrids of vine, apple, cherry, strawberry and many other fruits, vegetables, nuts, ornamental and forest trees, pointing out the particular significance that the method has had in the improvement of vegetatively reproduced plants. Examples of its successful application in self-fertilized plants are also given, e.g. hybrids of hexaploid and tetraploid wheats (Sarrubra, Hope, Thatcher, etc.) and of *Triticum* and *Agropyron*. Wheat-rye hybrids have been much less successful practically, though the amphidiploids of wild rye and *T. durum* obtained by Deržavin are of interest in being exceptionally productive, disease resistant and at the same time perennial, with unusually large grains. The success of Skovsted's cotton hybrids has been confirmed in the U.S.S.R., where hybrids have also been obtained between *Gossypium barbadense* L. and *G. Thurberi* Tod., the hybrid having then been crossed with *G. arboreum* L., with the production of fertile hybrids having a lint length of up to 45 mm. Amphidiploids have also been produced between *G. herbaceum* and perennial and African species and all possess larger seeds and longer lint than the parental species and are sometimes earlier or more disease resistant. Hybrids of Sea Island with *G. tomentosum* are nearly equal to Egyptian cotton in lint length and at the same time resistant to insects. Reference is also made to hybrids of *Avena sativa* x *A. byzantina* that are similar to the cultivated oat in type but are resistant to oat smut and crown rust; and to various promising interspecific hybrids of herbage plants.

The latest methods of inducing polyploidy will probably enlarge greatly the utility of wide crosses in practical breeding.

Numerous interspecific and intergeneric hybrids occurring in nature are mentioned, but the author, while recognizing the importance of hybridization as an evolutionary process, emphatically disagrees with Lotsy in acceding it the first and only place, and regards mutation combined with selection as the primary evolutionary process; due weight is also given to polyploidy as an evolutionary factor.

980. VAVILOV, N. I. 575.127:576.356.5:581.03:581.04:061.3(47)

Genetics in the U.S.S.R.

Chronica Botanica 1939 : 5 : 14-15.

A brief account of two Conferences held in the U.S.S.R. in 1938 on interspecific and intergeneric hybridization and on the use of physical and chemical methods for the induction of polyploidy.

981. KARPECHENKO, G. D. 575.127.2:576.356.5  
 [Crossability of species and doubling of the chromosome set  
 (Theses)].  
 Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 693-94.

Among the practical advantages of chromosome duplication are mentioned the removal of sterility, the enlargement of the range of crossability, etc., and the fact that chromosome elimination is frequently prevented: when tetraploid cabbage, for instance, is crossed with *Raphanobrassica*, as opposed to diploid cabbage in which the *Raphanus* chromosomes are eliminated (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 985).

When a tetraploid is crossed with another species a "dihaploid" is produced; this by chromosome duplication may give a "tetradiploid" which, if the parental genomes are sufficiently unrelated may be fertile and fairly constant; it is closer to the parent from which it received four genomes than is an ordinary amphidiploid; by crossing with the other parent it gives rise to an amphidiploid, which may in this way be produced from two species that do not normally cross, as has been done with *Brassica chinensis* x *B. oleracea*.

Chromosome duplication has been induced in a great many plants recently. Some of these have an immediate practical interest, as for instance the tetraploid barleys produced in the varieties Wiener and Nutans europeum 353, which are plants with strong straw, broad leaves and large ears, containing in many cases full complements of large grains with a thousand corn weight of 67 grm. as compared with 54.5 in the parental variety. Although quadrivalents and trivalents occur at meiosis the progeny are mostly tetraploid. The slight degree of sterility may possibly be removed by crossing different tetraploids together, or even by selection.

982. KUHN, E. 575.24:575.17  
 Ergebnisse der Forschungen über Genmutationen. (The results of  
 researches on gene mutations).  
 Züchter 1939 : 11 : 72-75, 95-105.

The subject is limited in the present paper to mutations with a monofactorial segregation and the results of research are reviewed under the headings spontaneous gene mutability, experimental induction of mutations and the theoretical conceptions on the mutation process and the structure of the gene.

The examples are taken mainly from work on *Drosophila*, but work on *Antirrhinum*, *Oenothera* and maize is also included.

983. GOODSPEED, T. H. and 575.243:576.312:537.5  
 UBER, F. M. 575.243:576.312:537.531  
 Radiation and plant cytogenetics. 575.243:576.312:535.61-31  
 Bot. Rev. 1939 : 5 : 1-48.

A review of research work involving the action of X-rays, ultra-violet rays and various kinds of particle radiation on plant cells. The types of nuclear change induced by irradiation and the cytogenetic consequences of such chromosomal alteration are dealt with in some detail. There is a bibliography of 326 references.

#### ORIGIN OF SPECIES, ETC. 576.1

984. DROOGLEEVER FORTUYN, A. B. 576.12:575.1  
 Het evolutieprobleem gezien in het licht der erfelijkheidsleer. (The  
 evolution problem regarded in the light of genetics).  
 Erfelijkheid in Praktijk, Leiden 1939 : 4 : 155-57.

Past and recent evolutionary theory and its relations with genetics are examined from the following aspects. The essential differences between phylogeny and ontogeny, the irreversibility of evolution, genotypic changes due to irradiation and the diverse effects of natural selection on organisms and its role in evolution.



The writer holds that the evolution problem is essentially a problem of the genotype; it has nothing to do with ontogeny and is only partially explained by palaeontology, embryology and comparative anatomy. On the other hand, experimental genetics must ignore the historical element in the evolution problem and cannot therefore solve it completely. Evolution should be studied, not in museums, but in nature by those adequately equipped with a knowledge of morphology, physiology and genetics.

985. IPAT'EV, A. N. 576.16:575:581.5  
**(Laws regulating the constitution of varieties that are populations—  
 The population as a basic unit in plant production).**  
 Trudy Sel'skokhozhjaistvennoi Akademii im. K.A. Timirjazeva (Transactions of the Timirjazev Agricultural Academy) Moscow 1937 : 2 : Part 3 : 102–14.

An analysis of the entity represented by a variety which is composed of a population. Such a variety consists of a "central race" (in Gunnar Hiorth's terminology) with other constituent varieties. The subject is treated from the following aspects: the various types of population—varieties, their systematic and their internal structure, their distribution and the laws underlying their composition with reference to the constituents and concomitant varieties and races. A knowledge of the constant components of such a variety may facilitate its identification and from the degree of genetical relationship between these components and the "central race" some deductions can be made about the ancestry of the variety.

The breeder's variety should, it is asserted, be made up of 100 per cent of plants of the central race with no other components.

986. SULMA, T. 576.16:576.356.5  
 Problem ras geograficznych w świecie roślin na tle badań cytologicznych.  
**(The problem of geographical races in the plant kingdom based on  
 cytological research).**  
 Kosmos, Lwów 1938 : 63 : (Ser. B.) : 227–320.

A detailed outline is given of the work of Turesson, of the phenomena of polyploidy, the various methods for its experimental induction, the relative frequency of polyploid variants within natural species and their characteristics, based on data of Müntzing and other authors. The various possible reasons for the reduction in size of the higher autopolyploids are discussed. Though the polyploid races occurring in many species are morphologically indistinguishable, they nearly always display differences of a physiological nature and often a different geographical distribution. The results of a great number of investigators show that autopolyploid races tend definitely to be later in maturity, although certain exceptions are cited; the rate of cell division is lower, they thus tend to be biennial or perennial in habit and the author supports the view that a great many of the existing perennials and biennials have arisen by chromosome duplication from existing annual forms. Examples are again cited, however, of plants in which polyploidy has not affected the vegetative cycle and of others where this is determined by specific genes. A tendency to vivipary and other asexual forms of reproduction is another characteristic of many autopolyploid species; others are bisexual as opposed to the diploid, which is dioecious, or are homostylous as opposed to the heterostylous diploid. Data are quoted from several authors in support of the view that polyploids are frequently more halophytic, or more tolerant of lime, of excessive moisture, nitrogen, high altitudes, extremes of temperature, drought, etc. Cases are also referred to, however, where polyploid races have proved less hardy than the diploids. Lastly reference is made to certain plants in which the polyploid races are more resistant to fungal attack.

In general, species or genera in which polyploid races occur are found to have a greater area of distribution; in consequence of the greater tolerance of the polyploid forms they tend also to cover more northerly areas where the diploids are unknown, although exceptions to this generalization occur. A table is given of all the known cases of differences in distribution in polyploid forms, and the author concludes that a large proportion of Turesson's ecotypes are actually polyploid variants of the species that have occupied a different area.

987. CLAUSEN, J.,  
KECK, D. D. and  
HIESEY, W. M. 576.16:582:575.12  
**The concept of species based on experiment.**  
Amer. J. Bot. 1939 : 26 : 103-06.

The authors distinguish two types of species, the coenospecies and the ecospecies. Coenospecies are separated by absolute genetic barriers, i.e. their hybrids, if they exist at all, are sterile unless doubling of the chromosomes takes place, thus giving rise to a new species. Ecospecies are not absolutely separated, but their hybrids are partially sterile and few of the second generation segregates can survive under competition. The transfer of genes from one ecospecies to another is therefore possible but severely limited by internal barriers and the ecospecies remain distinct. A coenospecies may be co-extensive with a single ecospecies or it may contain a number of them.

A third division of taxonomic significance is the ecotype. Here there is no genetic isolation, but ecotypes are separated ecologically or geographically and differ by many genes. When brought together, they hybridize freely. The ecotype is regarded as the evolutionary forerunner of the ecospecies.

A fourth category, the biotype, is merely due to variation through the recombination of genes in a population. It has no taxonomic significance.

In correlating these experimentally determined categories with standard taxonomic units, it is considered that the ecospecies corresponds to the taxonomic species and the ecotype to the sub-species. In cases where two ecospecies are morphologically indistinguishable, then they may be treated as one taxonomic species.

Where experimental evidence is lacking, it is recommended that the terms ecotype, ecospecies and coenospecies should not be used, but only their homologue, sub-species, species and species complex.

### CYTOLOGY 576.3

988. BEAMS, H. W. and  
KING, R. L. 576.312:578.088.2  
578.088.2:016  
**The effect of centrifugation on plant cells.**  
Bot. Rev. 1939 : 5 : 132-54.

This review includes a summary of the effects of centrifuging upon the resting and the dividing nucleus. There is an extensive bibliography.

989. MATSUURA, H. 576.312.315:576.312.34:635.26  
**(On the relation of chromosomes to nucleoli).**  
Bot. and Zool. 1935 : 3 : 1589-94.

The relation between nucleoli and the achromatic regions of satellited chromosomes is traced in various Liliaceae, including *Allium Schoenoprasum*. It is concluded that the chromonema itself has no relation to nucleolus formation, which is associated only with the achromatic regions of the chromosomes in question.

990. MÜNTZING, A. 576.356.5(48.5)  
Resultat och erfarenheter från verksamheten vid Sveriges Utsädesförenings  
kromosomavdelning. **(Results and experiences from the work of the  
chromosome department of the Swedish Seed Association).**  
Sverig. Utsädesfören. Tidskr. 1938 : 48 : 299-308.

The existing wheat-rye hybrids possess interesting, and valuable characters, but for practical purposes their yield is unsatisfactory. New types have, however, recently been produced, and it is hoped that some of them will show improvement. Improved types of cocksfoot grass have been found among the progeny of the cross between the usual cocksfoot with the wild species, *Dactylis Aschersoniana*. Some of the hybrids are pentaploid with 35 chromosomes, and therefore it has not been possible to produce constant progeny.

The method of temperature shocks for inducing polyploidy has been tried on barley at Svalöf and tetraploid plants have been produced.



Use has been made of the observation that twin seeds often differ in chromosome number, and a number of such seeds of cereals, grasses and potatoes have been investigated and have given triploid, haploid and tetraploid plants.

The observations made at Svalöf show that the frequency of twinning is relatively low. Triploids are the most frequent, then haploids and tetraploids are the rarest.

In timothy, 6 plants have been found by this method with 63 instead of 42 chromosomes. They showed marked fertility, both male and female, and the plants and their progeny had a higher weight than the standard. The possibility of building up 70 chromosome types is discussed and mention is made of the colchicine method for increasing the number of chromosomes.

991. KOSTOFF, D. 576.356.5:575.22  
**Heritable variations conditioned by euploid chromosome alterations.**  
 Chronica Botanica 1939 : 5 : 17-19.

The substance of this article is the same as that summarized in "Plant Breeding Abstracts", Vol. IX, Abst. 556.

992. WELLENSIEK, S. J. 576.356.5:581.04:575:578.08  
**The newest fad, colchicine, and its origin.**  
 Chronica Botanica 1939 : 5 : 15-17.

The literature relating to the use of colchicine in the induction of polyploidy in plants is briefly reviewed and the main uses of the process to the breeder and geneticist are pointed out.

993. RUTTLE, M. L. and  
 NEBEL, B. R. 576.356.5:581.04:575:633  
**Cytogenetic results with colchicine.**  
 Biol. Zbl. 1939 : 59 : 79-87.

A progress report of a breeding programme to demonstrate the practical value of colchicine to plant breeders. The plants used included: marigolds, *Mentha* sp., *Tradescantia*, *Phlox*, *Crepis* and *Ocimum Basilicum*. Other workers' results are reviewed.

994. KOSTOFF, D. 576.356.5:581.04:633  
 Production de plantes à caractères nouveaux par le doublement du nombre des chromosomes (polyploïdie). [**The production of plants with new characters by doubling the number of chromosomes (polyploidy).**]  
 Rev. Bot. Appl. 1939 : 19 : 81-88.

A study of nearly twenty species and hybrids with the doubled chromosome number shows that they can be divided into three groups: (1) with characters which increase in length according to the increase in chromosome number; (2) with characters which increase, diminish and do not change after duplication of the chromosome number; (3) with characters which as a rule do not change. Most polyploids fall into the first group, examples of the others are rare. The fertility of sterile hybrids is more or less completely restored. Notes are given on the use of colchicine and acenaphthene.

995. WERNER, G. 576.356.5:581.04:633  
 Untersuchungen über die Möglichkeit der Erzeugung polyploider Kulturpflanzen durch Colchicinbehandlung. (**Investigations on the possibility of producing polyploid cultivated plants by treatment with colchicine.**)  
 Züchter 1939 : 11 : 57-71.

Seeds of peas, spinach, flax, beans (*Phascolus vulgaris*) and kohlrabi (*Brassica oleracea* var. *gongyloides*) were soaked in 0.25, 0.50, 0.75 and 1 per cent aqueous solution of colchicine for 6, 12, 24, 48 and 72 hours. The seeds were then placed in damp sand in Petri dishes and the germinated seeds were later pricked out into suitable soil.

Soon after germination the different species showed differences in their reaction to the treatment. Peas and flax showed the greatest variation from the control, a thickening of the root

and hypocotyl being the most noticeable and the seedlings finally died off. Therefore the seedlings were allowed to germinate normally on sand and were pricked out on to a nutrient solution with the addition of 1 per cent of agar. When these seedlings were showing satisfactory growth, they were placed in a 0.5 per cent solution of colchicine for 6 or 12 hours. The plants were then removed from the agar, washed and planted out into suitable soil. Series I of the seedlings was placed more or less deeply in the solution, in series II the solution only reached to the cotyledons or to the surface of the agar.

At first all the treated seedlings were abnormal, later normal shoots developed from the untreated parts.

The results are then discussed in considerable detail with regard to their application towards a solution of the theoretical problem of the action of colchicine.

They confirm the opinion of other workers that colchicine has a definite specific reaction but it is pointed out that the action only affects dividing cells and that therefore the conditions of the growth of the plant when the treatment is applied are important. The possibility that the polyploid condition of the cells may set up physiological differences in the cells is considered and a plea is made that the production of polyploids should not be a matter of chance but that discrimination should be used in the choice of suitable methods.

996.

576.356.5:581.04:635.25

O'MARA, J. G.

576.312.34:578.08

**Observations on the immediate effects of colchicine.**

J. Hered. 1939 : 30 : 35-37.

The effect of colchicine on mitosis in root tips of *Allium Cepa* was studied, the results in general agreeing with those of Levan ("Plant Breeding Abstracts", Vol. VIII, Abst. 1637). It was noted that the threshold concentration at which colchicine has an observable effect varies greatly from cell to cell, even in the case of apparently similar cells of the same tissue. It is also pointed out that the hypertrophy associated with colchicine treatment affects the region of elongation of the root and not the region in which the nuclei are dividing.

The colchicine-treated chromosomes are more accurately measurable than ordinary somatic chromosomes and it is suggested that the drug may profitably be used in studies of chromosome morphology.

997.

576.356.5:581.05

SOKOLOVSKAJA, A. P. and

633.21:576.312.35

STRELKOVA, O. S.

633.285:576.312.35

**Polyploidy in the high mountain regions of Pamir and Altai.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 68-71.

A study of the floras of the high mountain regions of Pamir and Altai revealed the presence of a high proportion of polyploid forms, thus indicating the ability of polyploids to spread into regions with extreme climatic and edaphic conditions.

Cases are cited in the Gramineae, Compositae and Saxifragaceae where polyploid forms are confined to the mountain regions while related forms with lower chromosome number are restricted to the lowlands, e.g. in the Gramineae, *Poa sibirica*, *Alopecurus pratensis* and *A. geniculatus* ( $2n = 28$ ) are lowland forms, while *Poa alpina*, *P. altaica*, *P. tibetica*, *Alopecurus vaginatus* and *A. mucronatus* ( $2n = 56$ ) are native to high mountain regions.

In certain other genera, however, forms with low chromosome number occur in high mountain and lowland regions alike. It is considered likely that this occurs when, as is the case in *Gentiana*, the group in question actually originates in a particular mountain area and does not migrate there from the neighbouring lowlands.

998.

576.356.5:581.481

YAMAMOTO, Y.

**(Twin and triple-seeded plants and chromosome changes).**

Kagaku (Science) Tokyo 1937 : 7 : 147-51.

The frequency of twinning and of the occurrence of chromosome changes in twin-seeded plants varies according to the plant, strain or hybrid concerned. Twinning may, in the author's opinion, be genetically conditioned.



The external appearance of twin and triplet plants with chromosome changes is referred to and Suzuki's Universal Micro-printing method is recommended as the simplest way of identifying such plants.

The possible embryological basis of the production of twin and triplet plants is considered and various types of twinning are discussed from the theoretical standpoint.

The size of the young plants gives an indication of the chromosome number, triploids being, it is stated, very large.

## MICROSCOPIC TECHNIQUE 578.6

999.

578.6:581.33

633.913:575.127.2:581.331.23

633.52:576.356.5:581.036.1

PODDUBNAJA-ARNOLDI, V.

**(A rapid method of embryological investigation).**

J. Bot. U.R.S.S. 1938 : 23 : 349-57.

Reference is made to the author's method of studying pollen viability by germinating the pollen in sugar agar, followed by fixation in acetocarmine. Most cultivated plants showed complete viability, but in hemp, potato and rye a certain proportion of sterile pollen was observed; the same was observed in interspecific hybrids in the genera *Lathyrus* and *Taraxacum* and in the X-rayed pollen of peas, tobacco, onion and other plants.

Germination on the stigma was also observed by fixing the style with the stigma attached in 45 per cent acetocarmine or a mixture of acetocarmine and glycerine. This permitted the growth of the pollen tubes to be traced and even the male nuclei could be clearly detected.

By the use of these methods the author found that *Taraxacum tau-saghyz* and *T. kok-saghyz* are mainly cross-pollinated and that the pollen of a number of normal sexually reproduced species (*T. serotinum*, *multiscaposum*, *bessarabicum*, *caratavicum*, etc.) and of apomictic species (*T. hybernium*, *T. microspermum*, *T. officinale*, etc.) is capable of growing on the styles of *T. kok-saghyz* and conversely. In many of the sterile interspecific hybrids the pollen of the parental species grew on the hybrid styles better than the hybrid pollen.

The above method is not applicable to plants with very thick styles but has been applied with success also to the ovules, where the development of the embryo sac and the first stages in development of the embryo can be traced with ease. In this way A. I. Lutkov has determined the time at which the fertilized egg cell begins to divide and by application of high temperature to *Linum* at the time of the first division of the zygote has obtained tetraploid plants with  $2n = 64$ .

In some interspecific *Taraxacum* hybrids the embryo development was less rapid than in the parental species, in others no development took place at all owing to lack of fertilization. Development was particularly slow and abnormal in triple hybrids, e.g. *T. kok-saghyz* x *T. multiscaposum* pollinated by *T. serotinum*.

## PLANT DISEASES AND PESTS 632

1000.

FUCHS, W. H.

632-1.521.6:575

Wege und Erfolge der Resistenzzüchtung. (**Ways and results of breeding for resistance**).

Beretning om Nordiske Jordbrugsforskeres Forenings Sjette Kongres, Uppsala, Juli 1938. Nord. JordbrForskn. 1938 : Hefte 4-7 : 496-507.

A general discussion of the principles of breeding for resistance to disease, the practical results of such work and their economic importance.

1001.

VASILEVSKAYA, V. K.

632.112-1.521.6:633

**(On the significance of anatomical coefficients as indicators of drought resistance in plants).**

J. Bot. U.R.S.S. 1938 : 23 : 304-20.

Various anatomical features characteristic of xerophytic plants are described but the conclusion is reached that it is not possible by their use alone to select drought-resistant varieties.

1002. SOKOLENKO, N. F. 632.112:633.11-1.521.6  
**(The dependence of drought resistance in wheat on the stage of development and external conditions).**  
 Sovetskaja Botanika (Soviet Botany) 1938 : No. 6 : 10-23.

The drought resistance of a number of wheat varieties in different stages of their phasic development and grown under different conditions was tested. The conclusion is reached that drought resistance is a relative phenomenon, being influenced by all the external conditions to which the plant is subjected and varying with each developmental stage.

The various differences that have been reported between drought resistant and susceptible varieties are thought to be the result rather than the cause of drought resistance, which can be determined only by the yield produced by the plant after being subjected to drought during the most critical phases.

1003. TSELLE, M. A. 632.4:615.37:633.854.78  
**(The application of the serological method for estimating resistance in sunflower varieties).**  
 Selektivnaja i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 12 : 12-13.

Results of tests of resistance to rust, *Verticillium* and wilt by the serological method were found to agree closely with tests of resistance in the field and the method is thought to have a definite future in plant breeding.

1004. HUMPHREY, H. B.,  
 JOHNSTON, C. O.,  
 CALDWELL, R. M. and  
 COMPTON, L. E. 632.452:576.16:633.11  
**Revised register of physiologic races of leaf rust of wheat (*Puccinia triticina*).**  
 U.S. Dep. Agric., Bur. Pl. Ind., Div. Cereal Crops and Diseases, Washington, D.C. January, 1939 : Pp. 18. (Mimeographed).

This list contains an analytical key and a table detailing the reactions of races 1 to 108 of the fungus to nine standard test varieties of wheat. The Australian wheat variety, Thew, has now been added to the list of differential hosts.

1005. 632.6:633-1.521.6  
 635.652-2.6-1.521.6  
 BARRONS, K. C. 632.6:576.16  
**Studies of the nature of root knot resistance.**  
 J. Agric. Res. 1939 : 58 : 263-71.

A comparative study was made of rootlets of Alabama No. 1 and Kentucky Wonder beans (*Phaseolus vulgaris*) which are respectively highly resistant and susceptible to root knot caused by nematodes. It was found that as many larvae entered the roots of the resistant variety as of the susceptible one. The same was found to hold true for a number of other susceptible and resistant varieties of plants.

The Hopi 155 lima bean variety, which is somewhat resistant in the field, developed root knot to the same degree as the Henderson Bush lima in the seedling stage. As the roots matured, however, the galls on Henderson Bush developed at a greater rate than those on Hopi 155 which never grew very large and were less subject to decay than those of susceptible varieties.

It is suggested that root knot resistance is due to substances synthesized by the plant that counteract the giant cell inducing effect of the salivary secretions of nematode larvae. On the basis of this hypothesis two important questions are raised: (1) whether the phenomenon of host specialization in nematodes may not be due to genetic differences in the salivary secretions and in the resulting ability to induce giant cell formation rather than to differences in ability to enter the host, and (2) whether resistant plants may not be superior to susceptible ones as trap crops, since larvae appear to enter them in equal numbers but fail to reproduce.



## ECONOMIC PLANTS 633

1006. 633-1.524.4:575.42(47)  
 \*KATAR'JAN, T. G. 634-1.524.4:575.42(47)  
**(Sub-tropical science and its tasks).**  
 Soviet Subtropics 1939 : No. 4 (56) : 44-49.

Plant improvement at various experiment centres and research institutes of the U.S.S.R. is receiving much attention. As regards fruits and other economic crops, all the natural resources of the sub-tropical regions are being developed and suitable plant material from other countries too is being introduced and used in the campaign for better crops.

1007. 633-2.111-1.521.6:577.15  
 BLAGOVESHCHENSKI, A. V.  
**(Cold resistance of plants and the properties of ferments).**  
 Priroda (Nature) 1938 : No. 2 : 40-45.

An examination of the enzymes obtained from different species showed them to be different in their properties. Thus, the proteolytic enzyme of *Asimina triloba* required 17,400 calories to decompose peptone, whilst the proteolytic enzyme of *Wistaria chinensis* for the same reaction under similar conditions required only 2,400. Similar differences were observed in catalase activity, that from 4-day old barley seedlings requiring 8,400 calories to perform a reaction requiring 13,200 in the case of the catalase obtained from 4-day old seedlings of cucumber.

The rate of decomposition of  $H_2O_2$  at 25° C. by the catalase from different plants was more or less the same, but at lower temperatures the rates varied sharply. The van't Hoff coefficient of the change in rate for a difference of 10° C. also varied for the catalase obtained from different plants. A correlation was observed between this coefficient and the cold resistance, those plants giving the lowest coefficient being the most hardy. The results obtained from catalase observations were found to be in close agreement with the known hardness of a number of species of citrus. Phylogenetically younger species and genera appear to have lower values than more ancient forms and it is thought that the change has come about in the course of the ages, not so much in the nature of the climate as in the character of the enzymes of these plants.

## CEREALS 633.1

1008. 633.1:575(47.1)  
 SINISALO, J. 635.656:575(47.1)  
**The Finnish bred cereal and pea varieties.**  
 Helsinki 1938 : Pp. 9.

The author gives an account of the most noteworthy Finnish cereal and field pea varieties (amounting to 28) also at the same time reviewing the aims of the breeding work. K. M.

1009. 633.1-1.524.4:575.42(43.7)  
 SOBOTKA, M.  
 Československé původní odrůdy obilovin. (Šlechtitelé, původ, způsob  
 vyšlechtění, botanické a hospodářské vlastnosti, nároky na půdu a polohu).  
**[Czechoslovakian original varieties of cereals. (Breeders, origin,  
 mode of cultivation, botanical and economic properties, requirements  
 as regards soil and site)].**

Příručka Československého Zemědělce, Prague Sv. 4 : Pp. 68.

This booklet presents a survey of Czechoslovakian varieties of cereals. It is written for the grain farmers and others interested to enable them to choose the right variety for cultivation.

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\* An extended summary of this paper is on file at the Bureau.

# WHEAT 633.11

1010. FONDARD and CABASSON. 633.11:537.531:575.242  
633.11:538.569:575.242  
Fécondation croisée, rayons X, ondes courtes et mutations chez les blés de Provence. (**Cross-pollination, X-rays, short waves and mutations in Provençal wheats**).  
C.R. Acad. Agric. Fr. 1939 : 25 : 503-09.

The subject is introduced by M. Schribaux. The work of improvement of the two Provençal wheats, Saissette and Tuzelle, carried out by the last two authors is then described. Saissette and Tuzelle are excellently adapted to the local conditions but their yield is low. The two varieties differ in their response to hybridization. The characters of Saissette show no tendency to dominance and the hybrids soon become stable. The variety shows, however, numerous variations of value for selection. Tuzelle, on the other hand, tends to reproduce itself in any cross. For many years this variety which is autogamous was crossed with other lines of Tuzelle and finally a plant was observed, earlier and more vigorous than the original variety. The progeny showed considerable variations. Variations were also obtained by treating the pollen with X-rays and with short waves.

1011. LEHMANN, H. 633.11:575  
Herkunft, Verbreitung und Züchtung des Weizens, einer unserer wichtigsten und ältesten Kulturpflanzen. (**Origin, distribution and breeding of wheat, one of the most important and oldest of our cultivated plants**).  
Mühle 1939 : 76 : 113-15.

A brief and popular account of the origin of wheat and the results of breeding.

1012. ROMANOVICI, A. 633.11:575  
633.11 Mentana  
Originele varietății de grâu "Mentana". (**The origins of the wheat variety "Mentana"**).  
Viața Agric. 1939 : 30 : 55-57.

An account of the varieties of wheat contributing to the parentage of the Italian variety Mentana.

1013. PESOLA, V. A. 633.11:575(47.1)  
Hopea-kevätvehnä. (**Hopea spring wheat**).  
Valt. Maatalousk. Tiedon. 1938 : No. 145 : Pp. 18.

Hopea originates from the cross Marquis x Ruskea. It was put on the market in the year 1936. According to the tests made at agricultural experiment stations and local experiment fields it is 3-5 days earlier than Diamant (Diamond). The cultivation region of Hopea is considered to be the south of Finland up to about 61° 30' N. lat. In addition to its advantageous agronomic characters the baking quality of Hopea is good, somewhat better than that of Diamant.

K. M.

1014. PESOLA, V. A. 633.11:575(47.1)  
Sopu-kevätvehnä ja sen lähimmät kilpailijat. (**Sopu spring wheat and its most important competitors**).  
Valt. Maatalousk. Tiedon. 1938 : No. 150 : Pp. 17.

The parents of Sopu spring wheat are Marquis and Ruskea. The bulletin gives an account of results of tests with Sopu obtained at the division for plant breeding (Jokioinen) as well as of those obtained at various experiment stations and local experiment fields. On account of its earliness Sopu is suitable for the cultivation region of Central Finland and the southern parts of East Bothnia—from about 61° 20' to 62° 10' N. lat. The other properties of Sopu are favourable too, and its baking quality is fairly good. (Cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1143).

K. M.



1015. CARDOSA, C. P. 633.11:575(81)  
 Genética do trigo e sua influencia no melhoramento da lavoura triticea do  
 paiz. (**Genetics of wheat and its influence on the wheat production  
 of the country**).  
 Rev. Soc. Rur. Brasil. 1939 : 19 : No. 222 : 12-20.

The varieties at present grown in Brazil are very mixed but well adapted to the different regions in which they are cultivated, and the best way to improve them is considered to be selection within the different regional types. The genetical principles on which the method of pure line selection is based, together with the details of the method, are explained. Directions are also given for the work of artificial hybridization, which is recommended for special problems, such as rust resistance. One of the most promising of the hybrid wheats produced by the experiment station at Ponta Grossa is the variety P.G.1, characterized by resistance to rust, good yield and form of grain, though inferior in quality; newer varieties now being tested are expected to supersede it on account of superior quality.

1016. KRUG, C. A. and VIÉAS, G. P. 633.11:575(81)  
 O trigo no estado de São Paulo. Contribuição da Secção de Genética.  
 (**Wheat in São Paulo. Contribution from the Genetics Section**).  
 Bol. Téc. Inst. Agron. Campinas 1938 : No. 48 : Pp. 40.

Data are given regarding the climatic conditions in the eight zones of the state of São Paulo and discussed in relation to the possibility of cultivating wheat. A large collection of varieties has been established and observations have been made on their vegetative cycle, rust resistance, yield and drought resistance. A variety known as Montes Claros has been found to be well adapted to the conditions of the zone of that name and highly drought resistant; it was somewhat heterozygous and has been subjected to further study and selection. Results of variety trials are reported in which the new selections have proved distinctly superior in yield. These, together with Pusa 4, Pusa 80 5, Montana B and a local variety named Instituto have proved the most promising for attempting to cultivate wheat on an economic basis.

1017. WORZELLA, W. W. 633.11:575.12:578.08  
**The technic of producing a new soft wheat.**  
 Cereal Chem. 1939 : 16 : 188-94.

An account of the methods and objectives of "recombination breeding" by hybridization and selection.

1018. TANAKA, M. 633.11:575.127.2:537.531:581.162.5  
 (**The influence of X-ray treatment on the wheat crosses between  
 species having different numbers of chromosomes**).  
 Jap. J. Genet. 1938 : 14 : p. 271.

The effect of X-ray irradiation of the pollen and of the stigmas on seed-setting in crosses between *Triticum* species of different chromosome number was investigated. Irradiation of the pollen lowered its germination capacity in the cases studied. Irradiation of the stigma of the female parent in the cross *T. Spelta* (6x, ♀) x *T. Timopheevi* (4x, ♂) increased seed-setting to some extent. The percentages of seed set in the irradiated pollen, control and irradiated stigma plots of this cross were 0, 1.2 and 9.8 respectively.

The author considers that in inter-group wheat crosses in which the female parent is the one with the larger chromosome number, the set of seed is poor because the stigma exercises an inhibitory effect on the growth of the pollen. This effect is weakened by the action of X-rays on the stigma.

1019. SAPEHIN, A. A. 633.11:575.127.2:575.114  
 [Peculiarities in segregation of inter-specific hybrids between soft  
 and *durum* wheats (Theses)].  
 Bull. Acad. Sci., U.R.S.S., Sér. Biol. 1938 : p. 641.

Hybrids between *Triticum vulgare* and *T. durum* gave Mendelian segregation in  $F_2$  for very few characters, most characters reaching homozygosity. The soft and hard groups of segregates often behaved differently. The suggested explanation is the failure of the  $F_1$  chromosomes to separate at random.

Forms of breeding value are being obtained from the cross (Cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1490).

1020. 633.11:575.127.2:581.162.5  
 MAKUSHINA, E. N. 633.11:575.127.2:576.354.4  
 A new species of wheat, *Triticum armeniacum* (Jakubz.) sp. n.  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 345-48.

Crossing experiments involving the two subspecies of *Triticum dicoccoides*, ssp. *syrio-palestinicum* Flaksb. and ssp. *armeniaceum* Jakubz. showed that they were so distinct from each other as to deserve separate specific rank. It is therefore proposed to retain the present name for ssp. *syrio-palestinicum* and to refer to the other as *T. armeniacum*.

Hybrids between *T. dicoccoides* ssp. *syrio-palestinicum* and *T. armeniacum* were completely sterile, and the same was true of hybrids between *T. armeniacum* and various diploid and hexaploid wheats with the sole exception of the cross with *T. Macha*, from which two shrivelled back-cross grains were obtained. Hybrids between various tetraploids and *T. armeniacum* were completely self-sterile and showed only very slight fertility when back-crossed or open-pollinated.

Combinations involving *T. dicoccoides* ssp. *syrio-palestinicum* showed quite high fertility in many cases, the average for crosses with other tetraploid forms being 70 per cent.

Several tetraploid *T. armeniacum* hybrids were studied cytologically. They showed from 2 to 12 (or even more) univalents at meiosis and most of the bivalents were loosely paired. There were from 0 to 4 trivalents and quadrivalents per cell, the modal number being 1 or 2. Inversion bridges were also observed.

The almost complete sterility of the hybrids shows that there must be considerable differences between the genomes of *T. armeniacum* and those of other wheats.

1021. 633.11:575.127.5:633.11 *Aegilops*:575.129  
 SEARS, E. R. 633.11 *Aegilops*:575.127.2  
 576.356.5:581.04:581.162.5  
 Amphidiploids in the *Triticinae* induced by colchicine.  
 J. Hered. 1939 : 30 : 38-43.

The formation of amphidiploid sectors was induced in sterile hybrids of *Triticum monococcum* x *Aegilops uniariolata*, *Ae. caudata* x *Ae. umbellulata* and *Ae. speltoides* x *Ae. umbellulata* by treating the seed with colchicine. These sectors were fertile, the degree of fertility varying inversely with the amount of chromosome pairing in the original diploid hybrids. There was little or no morphological difference between the  $2n$  and  $4n$  tillers of the same plant except for a difference in stomatal size in two of the hybrids.

1022. 633.11:575.127.5:633.289  
 (Latest results of the *Triticum-Agropyrum* laboratory of N.V.  
 Tzitzin).

Sovkhoznaja Gazeta 24/IX, 1938 also Selektisija i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 12 : p. 33.

The annual *Triticum-Agropyron* hybrid No. 22850 has proved markedly superior to wheat in grain quality and also in standing capacity. Some of the new hybrids are unusually early in maturity, others very winter-hardy, and one at least of the perennial forms promises to be suitable for arid zones.



1023.

\*KHIIJNYAK, V. A.

633.11:575.127.5:633.289

633.11:575.129:633.289

(Form-genesis in wheat-*Agropyrum* hybrids).

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 597-626.

In these and other similar crosses it has been found that the best results are obtained when the self-pollinating species is used as the female parent, regardless of the chromosome number. Different ecotypes were also found to give different results.

The  $F_1$  of all combinations was characterized by wide variation in the number of bivalents and univalents, showing that none of the genomes are completely homologous. Pairing is furthermore in many cases thought to be autosyndetic. Two Algerian wheats, *T. durum* var. *africana pyramidale* Nos 16188 and 16308, produced hybrids distinguished by unusually high fertility (50-75 per cent on selfing).

The second generation of hybrids of wheat with *A. intermedium* consisted in 95 per cent of cases of plants derived from an unreduced  $F_1$  gamete. By back-crossing with wheat, various sesquidiploids and triple hybrids and by selfing, amphidiploids with  $2n = 70$  have been obtained.

The third generation plants from hybrids of the wheat type vary in number of bivalents and of univalents, variation occurring even in the soma. They segregate widely for both morphological and biological characters, some being perennial, some annual and others intermediate. The proportion of perennials is, however, low, and many of them are not hardy or not drought resistant, and the chances of producing suitable perennial forms from these crosses are thought to be distinctly low. A new procedure for procuring desirable perennial hybrids is described; it consists of pollinating the  $F_1$  or the amphidiploids with pollen from the sesquidiploid—the female gamete contains 14 wheat and 21 *Agropyron* chromosomes, the male gamete 14 wheat chromosomes and varying numbers, usually 0 to 16, *Agropyron* chromosomes; these latter will pair with their homologues and leave the remaining *Agropyron* chromosomes unpaired, so that they will ultimately be lost, leaving a plant with a diploid wheat complement plus a limited number of diploid *Agropyron* chromosomes. Crosses of this type have given a set equal to that obtained when pollinating the  $F_1$  with wheat pollen and from the *T. durum* x *A. intermedium* hybrid in this way plants have arisen with somatic chromosome numbers varying from 54 to 62. Meiosis was fairly regular and the plants produced 65-80 per cent of fertile pollen and a good set of grain—1-2 grains per spikelet, 25-40 grains per ear. Their ears were of the wheat type and produced large grain (18-25 mg.). Their progeny segregated as regards somatic chromosome number, which varied from 50 to 65; 90 per cent of them were perennial, drought resistant and fairly hardy and many (26 per cent) were highly fertile; 73 per cent of them had ears and grain of the wheat type and 27 per cent intermediate. The fertile segregates mostly had only 2-6 univalents, with 21-28 bivalents. Thus, by this means a rapid attainment of chromosomal balance and fertility has been achieved, and it is expected that genetically constant forms combining wheat and *Agropyron* characters will soon be obtained.

The method of partial amphidiploids is thought to be applicable to other wide crosses where a combination of the characters of two species is desired.

The cross *T. vulgare* x *A. elongatum* produces an  $F_1$  in which the reduced gametes are fertile and hence an  $F_2$  segregating for somatic chromosome numbers, which varies from 48-62, the most frequent being 54-56.

Some hybrids of the 28 chromosome wheats with *A. intermedium* are capable of self-fertilization and an examination of the progeny of these plants showed them to be amphidiploids formed from the union of unreduced gametes. The  $F_1$  plants are perennial and by reproducing them vegetatively it is possible to obtain several thousand selfed grains from a single  $F_1$ ; of these 95-98 per cent give rise to amphidiploids, of which many thousands have now been produced. The author separates them into a new genus which he designates *Agrotriticum*, the species being indicated according to the wheat parent participating, thus *Agrotriticum durum*, *Agrotriticum dicoccum*, etc. They all have 70 somatic chromosomes, fairly regular meiosis and a fertility of 93-97 per cent; they are all perennial. The plants are vegetatively very vigorous

\* An extended summary of this paper is on file at the Bureau.

and rust resistant. They are regarded as an exceedingly valuable new herbage plant capable of producing fodder, hay and grain for feeding purposes and selection is being carried out on them from this point of view, since though they are constant in the main characters they segregate for a number of minor characters. Selection is also being made in the more wheat-like types for the production of grain types and of perennial wheat; from this latter point of view *Agrotriticum persicum* is especially promising.

1024. VAKAR, B. A. 633.11:575.127.5:633.289:576.356  
 (A cytological study of  $F_1$ - $F_6$  *Triticum vulgare* x *Agropyrum*  
*intermedium* hybrids).  
 Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 627-41.

In continuation of earlier investigations (Cf. "Plant Breeding Abstracts", Vol. IX, Abst. 189) the author confirms the relative irregularity of the meiotic divisions in the  $F_1$  which is self-sterile and forms 7 or 14 bivalents according to the race of *A. intermedium* used. In the  $F_2$  hybrids obtained by pollination with wheat, there were invariably 21 bivalents and up to 14 univalents, the chromosome number in the second metaphase being generally less than 35, numbers down to 21 having been observed. Various irregularities of division and tetrad formation are reported.

In the  $F_3$  obtained by selfing the  $F_2$  meiotic irregularities were again observed, from 21 to 28 bivalents being present at metaphase I, with 3 to 14 univalents and tetrad formation being again disturbed. The  $F_4$  contained as a rule 21 bivalents, with univalents up to 21, the number of bivalents being occasionally higher than 21; certain forms without univalents were observed and when they contained 21 bivalents they were fully fertile. Such plants occurred also in  $F_5$  and  $F_6$ . Plants with 28 bivalents and no univalents also appeared in  $F_5$ .

The conclusion is reached that *A. intermedium* has two genomes in common with *T. vulgare*, these being referred to as  $A_a$  and  $D_a$  and  $A_i$  and  $D_i$  respectively; the  $A$  genomes are held to be more nearly homologous than the  $D$ , since one set occasionally fails to pair in the  $F_1$ . It is in the  $A$  genom that chromosome exchange is thought to occur, making possible the formation of balanced forms with  $2n = 42$  and containing certain *Agropyron* characters; when more than 21 bivalents are present they are thought to result from conjugation between chromosomes of the  $D_a$  genom and the purely *Agropyron* genom  $X_2$ . Balanced forms may also arise having  $28_{II}$  but these are of practical interest only if the  $X_2$  genom is absent. Constant forms with  $35_{II}$  are also possible, but since they must invariably contain the  $X_2$  genom, they are bound to resemble *Agropyron* and be of little practical value. The fact that only forms with complete genomes tend to be stable leads to the conclusion that the genom and not the chromosome is the evolutionary unit.

1025. 633.11:575.129:633.11 *Aegilops*:576.356.5:576.16  
 SOROKINA, O. N. 633.11-2.452-1.521.6:575.129  
 The rôle of amphidiploids and other balanced types in crosses  
 between widely separated forms.  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 20 : 591-94.

The behaviour of the following forms was studied in crosses with *Triticum vulgare*: (1) amphidiploid *Aegilops longissima* x *T. durum* ( $2n = 42$ ), (2) amphidiploid *Ae. ventricosa* x *T. durum* ( $2n = 56$ ) and (3) a pure-breeding 42-chromosome form obtained from the back-cross (*Ae. ventricosa* x *T. dicoccum*)  $F_1$  x *T. dicoccum*, in which the 14 *Ae. ventricosa* chromosomes apparently paired autosyndetically.

The cross with the *Ae. longissima* amphidiploid had very low fertility, and showed 14 bivalents and 14 univalents at meiosis. It appears, therefore, that the seven chromosomes of this species show little homology with *T. vulgare* chromosomes. Both hybrids involving *Ae. ventricosa*, however, showed high fertility in crosses with *T. vulgare* and the 42-chromosome *Ae. ventricosa* x *T. dicoccum* derivative showed a modal number of 21 bivalents in the  $F_1$  of crosses with both *T. vulgare* and *T. Spelta*. Hybrids between *Ae. ventricosa* and various tetraploid wheats, on the other hand, show only occasional bivalents. The *ventricosa* genom,



therefore, cannot be homologous with the A or B genomes of wheat, the observed homology probably being with the D genom of *T. vulgare*.

This demonstration of the homology of the *Ae. ventricosa* chromosomes was only made possible by the use of amphidiploid and similar derivatives. The high degree of compatibility and fertility of some such derived polyploid forms with wheat, indicates that they may be of importance from the point of view of the plant breeder. The above *Ae. ventricosa* x *T. dicoccum* derivative, for instance, shows exceptional resistance to all three species of rust and it may prove easier to transfer its resistance to *T. vulgare* than to rely on *T. vulgare* x *T. Timopheevi* crosses.

1026. SCHIEMANN, E. 633.11:576.16  
Zur Demonstration eines Weizen-"stammbaums". (**On the demonstration of a genealogical tree for wheat**).  
Biologe 1939 : 8 : p. 148.

A simple chart showing the probable derivation of the cultivated forms of wheat from their wild ancestors.

1027. CIFERRI, R. and GIGLIOLI, R. 633.11:576.16(63)  
La cerealicoltura in A.O.I. I.—I frumenti duri. (**Cereal culture in Italian East Africa. I. The hard wheats**).  
Ital. Agric. 1939 : 76 : 247-57.

The researches made on the 28 chromosome wheats of Abyssinia confirm and extend the earlier findings of Vavilov. The institution of a subspecies *abyssinicum* of *T. durum* related to the Mediterranean, European and North African subspecies *expansum* is justified by a series of differential characters. Variations found in the spike, grain, vegetative parts and in biological characters are noted and the regional distribution of some of the varieties is given. Descriptions are given of the two ecotypes *Grex subtypicum* Cif. and *Grex tenerum* Vav. and a third, less well defined, *Grex intermedium* Cif. is mentioned.

The distribution of the varieties with coloured grains according to altitude is tabulated.

1028. GIGLIOLI, G. R. and CIFERRI, R. 633.11:576.16:001.4  
Una "formula" per la caratterizzazione delle varietà, forme e razze di frumento. (**A formula for the characterization of the varieties, forms and races of wheat**).  
Agricoltura Colon. 1938 : 32 : No. 7 : Pp. 5.

A formula is devised for distinguishing the botanical varieties of wheat and the forms and races in the agricultural meaning of the terms. Only the characters of the ear are used. The colours of the awns, glumes and grains are indicated by a letter and the measurements and shape by a figure. The intermediate condition is indicated by a fraction sign.

1029. KAKHIDZE, N. T. 633.11:576.312.34:576.312.315  
**On the chromomere structure of wheat chromosomes.**  
C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 140-43.

A description of the detailed morphology of the two chromosome pairs of *Triticum durum* which are associated with nucleoli.

1030. AFANASSIEVA, A. S. 633.11:576.352:581.04  
576.356.5:581.04  
**The effect of convallarine upon the seeds of summer wheat.**  
C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 144-46.

*Triticum vulgare* grains were soaked for four days in 0.1, 0.2, 0.5, 0.8 and 1.0 per cent solutions of convallarine and their root tips subsequently sectioned and examined cytologically. No effect of the treatment was apparent in the case of the 0.1, 0.2 or 1.0 per cent solutions. Two of the plants treated with 0.5 per cent and two treated with 0.8 per cent solution showed

small tumours on the roots. These were due to the presence of large multinucleate cells in the sub-epidermal layers, the formation of which was due, in the opinion of the author, to the occurrence of nuclear divisions without accompanying wall formation and also to the migration of nuclei from surrounding cells into the large cell. There was no evidence that convallarine treatment could induce polyploidy.

1031. KIHARA, H. and YAMASHITA, K. 633.11:576.356.5:537.531  
633.11:576.354.4:576.356.52  
(Artificial production of haploid and triploid einkorn wheats by pollination with X-ray irradiated pollen).  
Commemoration Papers on Agronomy Prepared in Honour of Professor Masao Akemine on the Occasion of the Thirtieth Anniversary of his Academic Service by his Friends and Pupils, April 1938 : 9-20.

Among 17 plants grown from seed obtained by pollinating *Triticum monococcum* with X-ray irradiated pollen were one haploid and one triploid. The triploid was examined cytologically and showed the normal autotriploid type of chromosome behaviour, with a variable number of trivalents, bivalents and univalents. It produced only one grain, which gave rise to a dwarf, sterile plant. Chromosome behaviour in the haploid was similar to that reported earlier by the authors (Cf. "Plant Breeding Abstracts", Vol. IV, Abst. 957). The chromosomes showed an end-to-end association at diakinesis, sometimes in a complete ring of seven, but the connexions between them usually disappeared by metaphase I, leaving seven univalents which segregated at random to the poles.

The haploid plant gave a few good pollen grains, which were often found together in pairs in the anthers. When pollinated with diploid pollen, two grains were obtained from 1139 florets. These both gave diploid plants that showed normal chromosome behaviour and fertility.

The mode of origin of the haploid and triploid plants is discussed. The haploid seems to have arisen by parthenogenetic development of the egg cell, but since the grain from which it arose had a normally developed endosperm, the polar nuclei would appear to have been fertilized normally.

1032. DUMON, A. G. and WONTERGHEM, J. VAN 633.11-2.111-1.521.6:575(49.3)  
Onderzoek in verband met de wintervastheid van tarwerassen in 1938-1939. Een nieuw wintervast bastaardras: Astra. (Research on the winter-hardiness of wheat varieties in 1938-39. A new winter-hardy hybrid variety, Astra).  
Agricultura, Louvain 1939 : 42 : 26-47.

The views of previous workers on the physiological basis of winter-hardiness and the possible mode of inheritance of this character are discussed, with observations on the effects of environmental factors on the manifestation of cold resistance.

Experiments are contemplated to test the existence of a correlation between the time and extent of crown root formation on the one hand and winter-hardiness on the other, due attention being paid to the action of environmental factors (e.g. time of sowing, depth of sowing, temperature, soil and rainfall) upon the development of the crown root.

New strains specially recommended as winter-hardy on light soils are Astra and 0104/33. Surveying a number of hybrid strains in the winter of 1938-39 it was seen that most of those selected for testing derived from one of the following varieties: General von Stocken, Kroon (Crown), Staal (Steel) and Pantser (Iron), the best results of all being obtained with crosses comprising Staal as a parent. Tabulated data are given for frost resistance in variety trials held in 1929, 1933-34 and 1938-39, and attention is drawn to the differences found in resistance on light and heavy soils. Among the strains that can be regarded as completely winter-hardy were some hybrids derived from Staal or General v. Stocken and also the new strains of Astra and Astra A and lines 0104/33, 0638/32 and 0109/34, all bred by the Laboratory for Applied Genetics at Heverlee (Louvain).



Field observations on various crosses including Rufus x Alba, 0146/34 x Alba, and (Millioen x Kroon) x Trésor are stated to have shown that winter-hardiness is dominant to susceptibility to cold and dependent on a large number of cumulative, polymeric factors. The interspecific cross of Trésor with Beloturka gave in F<sub>2</sub> 14 frost resistant plants out of 80. The importance of winter-hardy northern varieties (including several well-known Swedish, American and other wheats) in breeding for cold resistance is emphasized.

1033.

BAYLES, B. B. and

633.11-2.111-1.521.6:575(73)

TAYLOR, J. W.

633.11-2.7-1.521.6:575(73)

633.11-2.45-1.521.6:575(73)

**Wheat improvement in the eastern United States.**

Cereal Chem. 1939 : 16 : 208-23.

The objective of the wheat improvement programme in the eastern United States is to improve the resistance of present-day widely adapted, high yielding commercial varieties to various crop hazards that now account for important reductions in yield and quality in certain seasons, the most important of which are winter killing, Hessian fly, lodging and various diseases. This paper summarizes the extent of the loss due to these causes and also the advances which have been made or are likely to be made in the near future to combat them.

Winter killing may be due to low temperature or to heaving, and one of the chief difficulties in breeding improved forms is the absence of a practical method of determining resistance to heaving. It appears that the varieties Minhardi and Minturki, which have very high resistance to low temperatures, are among the most susceptible to heaving damage. There are, however, other varieties which show relatively high resistance to both factors.

With regard to Hessian fly, the variety Illinois No. 1W38 and the *Triticum durum* variety E.P.I. 94587 have proved highly resistant in all tests and it has been shown that the resistance of the latter may be transferred to *T. vulgare* by hybridization. In California, Dawson has remained free or almost free from Hessian fly under conditions of heavy infestation and lines closely resembling the local varieties Big Club and Poso but with the Hessian fly resistance of Dawson have been obtained by hybridization.

A number of new hybrids have been obtained which are resistant to both leaf and stem rusts. Of particular note are Hope x Hussar (C.I.11682) and Mediterranean x Hope (C.I.11763), which, though not suitable for commercial production, have been used as parents in further crosses.

Work on breeding for resistance to loose smut is still in the early stages, but the varieties Kawvale, Illinois No. 2 and Hope are resistant to all the races of the fungus so far used in tests. It should be comparatively easy to transfer this resistance to commercial varieties.

With regard to bunt, there are several pairs of varieties which together contain factors for resistance to all known races. The selection C.I.10068-1 from a Hussar x Hohenheimer cross appears to combine these factors and has proved highly resistant to all known races of bunt. Certain other new selections also appear to have a very high degree of resistance.

Other diseases of lesser importance that are being given consideration in the breeding programme are mosaic, leaf spot (*Septoria tritici*), glume blotch (*S. nodorum*) and scab.

1034.

NIZEN'KOV, N.

633.11-2.111-1.521.6:578.081

**(The new method of determining the frost resistance of winter wheat).**

Selektsija i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 12 :

p. 35.

Replying to enquiries relating to the method described in an earlier article (Cf. "Plant Breeding Abstracts", Vol. IX, Abst. 204) the author states that the technique ought to be applicable to forest trees, though the point can be settled only after direct experiment. Various questions regarding the details of construction and manipulation of the apparatus are also answered.

1035. FRÖIER, K. 633.11-2.3-1.521.6:575.11  
 Brunfläcksjuka (*Bacterium translucens* var. *undulosum*) och dess angrepp  
 på olika vetesorter. [**Black chaff (*B. translucens* var. *undulosum*) and  
 its attack on various wheat varieties**].  
 Beretning om Nordiske Jordbrugsforskeres Forenings Sjette Kongres,  
 Uppsala, Juli 1938. Nord. JordbrForskn. 1938 : Hefte 4-7 : 536-43.

The recent literature on the relation of the black chaff disease of wheat to *Bacterium translucens* var. *undulosum* is briefly reviewed.

Observations made at Svalöf on a cross between Brunt Schlanstedtervårve (Brown Schanstedt spring wheat) and line 0715 from a Norwegian spring wheat from Börsum showed that while some of the progeny were heavily attacked by black chaff, others were less so. The results suggested that both parents possess complementary susceptibility factors for black chaff. The resistance of a number of varieties graded from 1-10 showed that Atle spring wheat is susceptible in class 2-3 and the most resistant is the new Diamond II in class 10.

1036. VIK, K. 633.11-2.421.1-1.521.6:575.11  
 Melduggresistens hos vårhvete. (**The resistance of spring wheat to  
 mildew**).  
 Beretning om Nordiske Jordbrugsforskeres Forenings Sjette Kongres,  
 Uppsala, Juli 1938. Nord. JordbrForskn. 1938 : Hefte 4-7 : 508-15.

The author discusses the results of the work on breeding for resistance to mildew, already reviewed in "Plant Breeding Abstracts", Vol. VIII, Abst. 1166.

1037. ABE, T. and 633.11-2.452-1.521.6:576.356.5:575.127.2  
 MATSUMURA, S.  
 (**On the susceptibility of back-crossed offspring of pentaploid wheat  
 hybrids to *Puccinia tritricina***).  
 Proc. Crop. Sci. Soc. Japan 1938 : 10 : 71-84.

F<sub>1</sub> hybrids from *Triticum polonicum* x *T. Spelta* and *T. durum* x *T. vulgare* were used in this study.

It was found that in the hybrids from varieties of the emmer group crossed with an F<sub>1</sub> with 28-35 chromosomes, susceptibility to the disease increased with the number of D genom chromosomes present. In the hybrids obtained by crossing varieties of the *vulgare* group with an F<sub>1</sub> with 35-42 chromosomes no appreciable correlation was found between increased susceptibility and increased chromosome number and the reaction of a plant containing one D genom differed but little from that of a plant containing two such sets.

The basic gene for susceptibility is believed to lie in the D genom and has a dominant effect. The possibility is mentioned of breeding highly resistant *vulgare* types by chromosome re-arrangements in the A and B genomes of tetraploid strains and of varieties of the *vulgare* group. Pentaploids are also regarded as promising material.

1038. MIYAKE, M. 633.11-2.8-1.521.6:575.11  
 (**Mendelian inheritance of resistance to mosaic disease in wheat  
 varieties**).  
 Jap. J. Genet. 1938 : 14 : 239-42.

Observations on the reaction of the F<sub>1</sub> and F<sub>2</sub> progeny from a series of crosses of varieties of wheat to yellow and to green mosaic, led to the conclusion that resistance to both forms of disease was due to a single dominant mendelian factor.

# OATS 633.13

1039. LINLAND, D. 633.13:575(48.1)  
Jøtul. En ny grønnfôrhavre. (Jøtul. A new green fodder oat).  
Meld. Stat. Forsøksgård Forus (1937) : 1938 : H 36-40. Contained in Meld.  
Stat. Forsøksstasjoner Plantekultur (1937) : 1939.

This variety is derived from a cross of J.2, from a line of grey oats x Sølv II oats (Silver II oats). It is a quick-growing variety with thick and stiff straw. Its grain quality is good. It is a promising variety, not only for green fodder, but also as a seed producer.

1040. ÅKERMAN, Å. 633.13:575(48.5)  
Vvalöfs Primushavre. (01463b). Ny, tidigt mognande vithavre med hög  
avkastning och utmärkt kvalitet. [Svalöf's Primus oat. (01463b).  
New, early ripening white oat with high yield and conspicuous  
quality].

Sverig. Utsädesfören. Tidskr. 1938 : 48 : 465-70.

Primus oat is derived from the cross Seger (Victory) x Gopher (Engströms Favorit) made in 1926.

The new variety is very early and has stiff straw. It has shown itself in comparative tests to be high-yielding and of excellent quality.

1041. MEISNER, A. F. 633.13:581.143.26  
(Aftermath oats).  
Selektsija i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 12 :  
7-11.

A form of oats is described which after the grain has been harvested gives a valuable aftermath of green fodder which may be grazed, made into hay or even grown for grain. The type is found to be hereditary. In comparison with the standard Moscow variety A-315 it proved somewhat inferior in grain quality but superior in yield of grain and straw. The straw is more nutritious than that of ordinary varieties and the aftermath displays a considerable degree of frost resistance.

1042. POHJAKALLIO, O. 633.13-2.451.2-1.521.6:575(47.1)  
Über die Brandresistenzzüchtung von Hafer. (On the breeding of smut  
resistant oats).  
Maataloust. Aikakausk. 1939 : 11 : 97-107.

The resistance to smut of a number of Finnish and foreign oats as well as of hybrids and populations is tabulated. Only the reaction to loose smut, *Ustilago avenae* (Pers.) Jens. was investigated as covered smut, *U. laevis* (Kell and Sw.) does not occur at Jokioinen and is rare in Finland.

By continued breeding of smut material on pure lines of oats, the genetical composition and at the same time the pathogenicity of the smut material may be altered.

The oat varieties Markton, Carleton and Black Mesdag were the most valuable for breeding for resistance, and it is hoped that by means of hybridization smut-resistant lines may be built up for Finland.

1043. POHJAKALLIO, O. 633.13-2.451.2-1.521.6:575.11(47.1)  
Resistensföreläggning mot *Ustilago* hos havre. (Breeding oats for resistance  
to *Ustilago*).

Beretning om Nordiske Jordbrugsforskeres Forenings Sjette Kongres,  
Uppsala, Juli 1938. Nord. JordbrForskn. 1938 : Hefte 4-7 : 516-25.

Some of the results of breeding smut-resistant varieties of oats for Finland are discussed. Most Finnish varieties are susceptible. Petkuser Gelbhafer (Petkus yellow oats) and line 094 of President oats are for practical purposes resistant to the smuts occurring at Jokioinen. Other resistant varieties are line 0281 from Alahärmä oats, Pflugs Frühhafer (Pflug's early oats), Lischower Frühhafer (Lischow early oats) and the Welsh line S.171.



Crosses between two susceptible varieties give only susceptible progeny, and crosses between two resistant varieties will in subsequent generations produce resistant progeny. At least two factors are concerned with resistance to smut and the heterozygous families must be individually investigated.

# RYE 633.14

1044. NIKLEWSKI, B. and GRZESIAK, A. 633.14(43.8)  
633.14:575(43.8)  
Uprawa żyta w Polsce w świetle doświadczeń. (**The cultivation of rye in Poland in the light of investigations**).  
Życie Rolnicze 1938 : 3 : No. 31 : 17-19 ; No. 32 : 18-21 ; No. 33 : 16-20 ; No. 34 : 14-17 ; No. 36 : 15-19.

The origin of cultivated rye is discussed; its introduction into Poland was later than that of wheat. Data are given regarding the extent of cultivation in Poland, and other countries, its utilization, conditions of cultivation and manurial requirements. The last part of the article is devoted to problems of breeding; in recent years several improved varieties have been obtained by selection from Petkus or by crossing it with local ryes. These new varieties are better adapted to local conditions, and superior to Petkus in resistance to drought and diseases. Comparative yield trials of these varieties on different types of soil are reported; the variety Zeelandzkie proved the best on heavy soils, Włoszanowskie on medium and light soils. The variety Puławskie Wczesne (Puławy Early), which is resistant to rust, has given good yields on light soils in affected areas, and in certain other areas the local varieties have proved the best owing to their resistance to frost and disease.

The grain size and quality was found to be better in varieties with green grain, those with the best quality being Petkus, Rogalińskie and Włoszanowskie.

1045. PRZYBOROWSKI, J. and RUEBENBAUER, T. 633.14(43.8)  
Doświadczenia z odmianami żyta przeprowadzone w Polsce w latach 1933-1936. (**Investigations with varieties of rye carried out in Poland in the years 1933-1936**).  
Wydawnictwa Sekcji Nasienniej przy M.T.R.wKrakowie i Zakładu Hodowli Roślin i Doświadczalnictwa U.J. 1938 : No. 21 : Pp. 27.

In view of the relative heterozygosity of most cereal varieties they tend, under the influence of selection, conscious or unconscious, to change gradually in the course of time, though preserving their original name. This is particularly true of cross-pollinating plants such as rye. The rye varieties in Poland are much less varied than those of countries farther east, and consist exclusively of forms of one only of the Antropovs' forty-six botanical varieties. The number of genetic characters is in fact diminishing in consequence of the replacement of the old land races by more uniform varieties produced by breeding. This process may lead to the loss of certain characters valuable in crossing, and breeders are urged to preserve the old races while there is yet time. For this purpose data are presented in the present bulletin on the existing Polish varieties, the origin of which is indicated. Out of twenty-one varieties seven are descended directly from Petkus, and a further five from crosses of Petkus with other varieties. Several others descend directly or by crossing from the variety Zeelandzkie. Varieties descended from local races include Mikulickie Wczesne and its parent variety Polskie Grodkowickie, and also Sobierszyńskie and Bieniakońskie. Puławskie Wczesne is derived from Hanackie Proskowetz and the variety Wierzbieńskie Wczesne from crosses between Wierzbieńskie and Mikulickie.

Data are given on the relative time of maturity of the main varieties. The early varieties tend to have thinner straw and be more subject to lodging. On the basis of the yields obtained by the varieties in the four main regions of Poland, the authors give their views on the value of each variety in turn. The best yields were obtained from Zeelandzkie Hildebranda, closely followed by Włoszanowskie and Petkus.

1046. PELSSENKE, P. 633.14:575(43)  
 Deutsche Roggensorten und deutsche Roggenzüchtung. (**German varieties of rye and German rye-breeding**).  
 Mehl u. Brot, Berlin 1937 : 37 : No. 28 : 1-2.

German rye varieties are almost exclusively derived from land races. In 1934, 82 varieties were recognized, the number has now been reduced to 14 of which 12 are conditionally recognized and the remaining two are Petkus and Deutscher Ringroggen (German ring rye). Petkus is by far the most important variety and occupies 90 per cent of the area of rye cultivation. An account is given of the selection of Petkus from land races by von Lochow.

1047. DERHAVIN, A. I. 633.14:575.127.5:633.11:581.143.26  
**Results of work on breeding perennial varieties of wheat and rye (Theses)**.  
 Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 663-65.

By pollinating wheat with *Secale montanum* Guss. a 37.7 per cent set was obtained, 29 hybrid plants being produced. The different wheat species differed in their results, the highest set being obtained with *Triticum vulgare*, *T. durum*, *T. turgidum* and *T. polonicum*; different races of both parents also differ in the set and in the degree of sterility of the hybrids, which were most fertile in crosses from Transcaucasian wheat with Armenian rye. An amphidiploid with 42 somatic chromosomes was obtained in the cross *T. durum* var. *leucurum* 1364 I x *S. montanum*, from which several thousand plants have been obtained and examined; of these six with a tough rachis have been retained and are being subjected to further selection. They are apparently immune to yellow and stem rust and very resistant to brown rust and they have remained free from attack by smuts. They have given very high yields of large grain and cross readily with *T. vulgare* and *T. durum*. They are being crossed with the best cultivated wheat varieties and also among themselves.

A perennial rye with tough rachis obtained by crossing cultivated with perennial rye is also being used in crossing and attempts are being made to induce duplication in the hybrid.

1048. SHMARGON, E. N. 633.14:576.312.341  
**Analysis of the chromomere structure of mitotic chromosomes in rye.**  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 259-61.

A study was made of the chromomere structure of the satellited chromosome in meiosis and in mitosis. At pachytene there were about 50 chromomeres, six of them being distal to the nucleolar organizing body. In mitosis these "ultimate" chromomeres fused into a fixed number of larger bodies, eleven in all. Six of them were in the long arm, three in the short arm and two in the satellite.

1049. NORDENSKIÖLD, H. 633.14:581.036.1:576.356.52:576.354.4  
**Studies of a haploid rye plant.**  
 Hereditas, Lund 1939 : 25 : 204-10.

A haploid rye plant was obtained by heat treatment of the parent plant after emasculation and pollination. It was smaller than the normal diploid and showed seven univalents in most cells at metaphase I, though in about 3 per cent of cells there was one bivalent with a single chiasma. At anaphase I the undivided univalents were distributed at random to the poles and the second anaphase was as a rule regular. The tetrads nearly all degenerated and the ripe anthers did not dehisce, though they contained a few apparently normal pollen grains. No seed was set by the haploid plant.

1050. TOUMANIAN, M. G. 633.14:581.143.26  
**(Perennial semi-cultivated rye in Armenia).**  
 Sovetskaja Botanika (Soviet Botany) 1938 : No. 6 : 100-02.

The wild rye found growing in the mountains near Daralagez is perennial and possessed of a tough rachis; compared with the common *Secale montanum* the habit of the plants is more compact, the ear is longer and denser, containing a greater number of grains, which do not

shed and are distinctly larger. It is therefore classed as a new species, *S. Daralagesi* Tum. sp.n. It is thought to be a relic of a rye cultivated in olden times and is of interest to breeders on account of its exceedingly low cultural requirements. It crosses very readily with wheat.

1051. SCHAD, C. and HUGUES, P. 633.14:581.162.3:575.125  
Biologie florale du seigle. (**The floral biology of rye**).  
Sélectionneur 1938 : 7 : 88-95.

Anthesis in rye is described and the results of self-pollination are noted. The crossing of families which have been selfed for several generations and are homozygous leads to heterosis in the progeny. The results, however, vary considerably and the number of hybrids showing a higher yield than the parents decreases rapidly in the following generations.

The cross local rye x improved rye gives a higher proportion of high-yielding hybrids than the reciprocal cross.

A study of the inbred families shows which are of the greater value as parents. This method has been used in crossing the local types with foreign rye and the variety Grand Crouelle has resulted from a complex cross of the progeny of selfed plants of Petkus, Krafit's Zélande and local rye. It is as high-yielding as Petkus, as early as Zélande, has the straw qualities and hardness of the local rye and is resistant to lodging.

1052. ANTROPOV, V. I. 633.14:581.162.32  
(**Is spatial isolation necessary between sowings of varieties of rye**).  
Seleksija i Semenovodstvo (Breeding and Seed Growing) : 1938 : No. 11 :  
14-18.

This paper forms part of a discussion to which contributions are invited on methods of seed production from cross fertilized plants and on the advisability or otherwise of isolation of varieties. The work of Roemer, Sprague and others is reviewed and the author concludes that isolation is necessary at stations engaged in seed selection, but need not be so rigidly applied in seed production for commercial purposes.

1053. JUR'EV, V. JA. 633.14:581.162.32  
(**Isolation of winter rye and the influence of cross-pollination on different varieties**).  
Seleksija i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 11 : 19-  
21.

Experimental data are cited to demonstrate the necessity of spatial isolation where it is desirable to ensure varietal purity. Cross pollination for several generations between the varieties Petkus 194 and Nemyšljanka was found to lead ultimately to a reduction in yield and size of grain as compared with the parent forms.

A possible explanation is offered of the observations upon which Lysenko based his opinion that isolation was unnecessary.

Further data from experiment stations should be examined in order to decide this important problem.

## MAIZE 633.15

1054. ZAPPAROLI, T. V. 633.15:575(45)  
Il granoturco "Marano". (**The maize "Marano"**).  
Ital. Agric. 1939 : 76 : 155-59.

A description of a variety of maize derived from the cross Nostrano locale x Pignoletto d'oro. Marano is very early, ripening in the first ten days of September, and very high-yielding. The ears are small but numerous and the cob is slender.



1055. ZAPPAROLI, T. V. 633.15:575(45)  
 Il granoturco "Scagliolo 23 A". (The maize "Scagliolo 23 A").  
 Ital. Agric. 1939 : 76 : 239-45.

The variety, a selection from the original Scagliolo is described. The plants are luxuriant and bear one or two large ears with big yellow grains. They ripen about the second half of September. The variety is susceptible to corn smut but selection is being made for resistance.

1056. BRIEGER, F. G. 633.15:575(81)  
 Problemas de melhoramentos do milho. (Problems of maize improvement).  
 Rev. Soc. Rur. Brasil. 1939 : 19 : No. 222 : 38-42.

The existing strains of maize in Brazil are very mixed and the advantages of improving them by the method of crossing inbred lines are outlined. The gain in adaptability procured by crossing the hybrids further with a number of different inbred lines is mentioned and indications are given as to the best type to aim at for various purposes; some of the forms cultivated by the Indians are possessed of very desirable characters and their use as parent material is recommended. Reference is made to the production by the author of early lines completing their vegetative cycle in 80 days.

1057. CAPINPIN, J. M. 633.15:575.061.634:581.483  
 633.15:575.113.7:575.242  
 A lethal-linked kernel variation of Lagkit corn.  
 Philipp. Agric. 1939 : 27 : 866-74.

A recessive mutant seed defect found in various strains of Lagkit maize was characterized by wrinkled, shrunken, horny endosperm. On germination, these defective grains gave albino seedlings which soon died.

1058. MARINO, A. E. 633.15:575.11.061.6:581.48  
 Herencia del color de aleurona en el maíz "piamontés". (Inheritance of aleurone colour in the maize Piamontés).  
 Bol. Tec. Inst. Exp. Invest. Fom. Agric. Ganad. 1937 : No. 5 : Pp. 32.

Plants of the variety Piamontés Colorado Klein, with colourless aleurone and pericarp but flinty, pigmented endosperm were crossed with testers recessive respectively for each of the three aleurone colour genes *A*, *C* and *R*. The results are described for the  $F_1$ ,  $F_2$  and back-cross generations, leading to the conclusion that the original plant was of the constitution *AaCICrPrpr*, where *I* is a colour inhibitor and *Pr* a modifier.

1059. RHOADES, M. M. and 633.15:575.116.1:575.116.4  
 RHOADES, V. H.  
 Genetic studies with factors in the tenth chromosome in maize.  
 Genetics 1939 : 24 : 302-14.

Linkage data are presented which show that the gene for resistance to *Puccinia sorghi* Schw. (*Rp*) is located in chromosome 10 and which also establish the map position of the genes *li* (lineate striped leaves) and *d<sub>7</sub>* (dwarf plants). Two previously undescribed characters designated *sp<sub>2</sub>* (small pollen) and *l<sub>8</sub>* (luteus seedlings) are reported. The former has a semi-lethal effect on the male and female gametophytes. Pollen grains carrying *sp<sub>2</sub>* were smaller than normal and 96.6 per cent of them were unable to compete successfully with normal pollen. Forty-four per cent of *sp<sub>2</sub>* grains were infertile. Crossing-over is reduced in adjacent regions when *sp<sub>2</sub>* is heterozygous. Studies of pachytene material did not reveal any obvious structural change associated with the *sp<sub>2</sub>* gene.

A revised genetic map for chromosome 10 is given. The linear order of genes is *Rp*, *sp<sub>2</sub>*, *li*, *l<sub>8</sub>*, *g*, *R*, *d<sub>7</sub>* and previous studies have shown that *Rp* is situated near the end of the short arm of the chromosome and *R* fairly near the end of the long arm.

1060. EMERSON, R. A. 633.15:575.116.4:575.113.7  
**A zygotic lethal in chromosome I of maize and its linkage with neighboring genes.**  
 Genetics 1939 : 24 : 368-84.

In a strain of Bolivian maize a recessive zygotic lethal gene, *zl*, was found to be present in chromosome I. It was closely linked with the genes for pericarp colour (*P*), male-sterile 17 (*ms<sub>17</sub>*) and tassel-seed 2 (*ts<sub>2</sub>*), the linear order and cross-over percentages being *ms<sub>17</sub>*-1.7-*ts<sub>2</sub>*-1.3-*P*-1.5-*zl*. The values for linkage with *zl* had to be determined by a special method owing to the nature of the character.

1061. ANDERSON, E. G. 633.15:575.116.4:576.356.2  
**Translocations in maize involving chromosome 8.**  
 Genetics 1939 : 24 : 385-90.

Data are presented on the linkage relations between nine translocations involving chromosome 8 and the genes *ms<sub>8</sub>* (male-sterile 8) and *j<sub>1</sub>* (japonica). The cytological positions of seven of the translocations were determined and it was shown that *ms<sub>8</sub>* and *j<sub>1</sub>* are situated in the terminal quarter of the long arm of the chromosome, with *j<sub>1</sub>* the nearer to the end.

1062. PHILP, J. 633.15:575.12(62)  
**A comparative test of the yield of F<sub>1</sub> hybrids between inbred lines of maize.**  
 Bull. Minist. Agric. Egypt 1939 : No. 202 : Pp. 6.

Crosses were made between selected inbred lines of the Egyptian maize varieties American Early and Giza Beladi and a comparative yield test showed that the hybrids yielded up to 27 per cent more grain than the open-pollinated varieties. It is proposed to continue selection within selfed lines and to test various combinations of lines in double crosses.

1063. DUNGAN, G. H.,  
 WOODWORTH, C. M.,  
 LANG, A. L., 633.15:575.12(77.3)  
 BIGGER, J. H. and 633.15-2.7-1.521.6:575  
 SNELLING, R. O. 633.15.00.14(77.3)  
**Developments in hybrid corn production.**  
 Illinois Fmrs' Inst., Springfield 1939 : Pp. 51.

The method of producing "hybrid corn" and the principles upon which the method is based are outlined. Reference is made to the performance of hybrids tested in Illinois, the results of variety trials throughout the state being given. The question of insect attack is dealt with at some length. The pure lines and hybrids tested show considerable differences in their resistance to chinch bugs (*Blissus*), southern corn root worm (*Diabrotica*), grasshoppers, white grubs (*Phyllophaga*) and corn earworms (*Heliothis*). Resistance to each of these insects appears to be determined by a distinct set of genes, and resistance to one appears to be inherited independently of resistance to another. It may therefore ultimately be possible to produce pure lines resistant to all important pests, but in the meantime much can be done by combining lines with resistance to different pests.

There are indications that the following pure lines are resistant to insect attack: to *Blissus*, Hy, 90, 5120, 38-11, Pr, K4, WF9, R4; to grasshoppers, L317, 38-11, Pr; to *Heliothis*, 90, Hy, R4 and Pr.

Experiments showing the adaptation of various hybrids to particular soil fertility levels are described. With high soil fertility the five highest yielding hybrids yielded 17.5 bushels per acre higher than the control open-pollinated strain. At a low level of fertility these five hybrids yielded only 1.2 bushels more than the control, but five other hybrids averaged 7.1 bushels per acre above the open-pollinated control. Similar adaptation to particular soil types was demonstrated.

1064. SPRAGUE, G. F. 633.15:575.12:578.08  
633.15:575.12(77.8)

**Corn hybrids for Missouri.**

Circ. Mo. Agric. Exp. Sta. 1939 : No. 201 : Pp. 27.

The technique of the production of double-crossed hybrid maize is described, with an elementary exposition of the principles involved. Descriptions are then given of the three hybrids eligible for certification in Missouri (Missouri No. 8 and No. 47 and Iowa 13) and of the inbred lines involved in their production. The latter are supplied to growers in limited quantities by the Missouri Agricultural Experiment Station.

1065. WU, SHAO-KWEI. 633.15:575.125:578.08

**The relationship between the origin of selfed lines of corn and their value in hybrid combination.**

J. Amer. Soc. Agron. 1939 : 31 : 131-40.

Yield comparisons were made between single crosses between maize inbred lines selected from known crosses. Four groups were compared, crosses between (a) pairs of inbred lines which had both parents in common, (b) pairs of lines with one parent in common, (c) unrelated pairs of lines and (d) top-crosses with an open-pollinated variety.

In general, the single crosses in group (a) gave significantly lower yields than those of group (b) or group (c). There was no significant difference between the yields of crosses in groups (b) and (c). It appears that better commercial maize hybrids may be expected when pure lines of diverse genetical origin are combined, rather than related pure lines.

1066. MATHER, K. 633.15:576.354.46:576.356.4

**Competition for chiasmata in diploid and trisomic maize.**

Chromosoma 1939 : 1 : 119-29.

The presence of an extra chromosome or of an extra short arm of chromosome V in maize is shown to increase the mean number of chiasmata formed per nucleus and to diminish the competition for chiasmata between the chromosomes. The extra chiasmata are, as far as can be judged, shared by all the bivalents and are not confined to the trisomic chromosome. These phenomena are in agreement with the view that competition between bivalents for chiasmata is determined by the presence of an effective upper limit (which is subject to genotypic control) to the number of chiasmata which may be formed in a nucleus.

The bearing of these findings on studies of chiasma frequency in polyploid series is discussed.

1067. 633.15:581.163:576.356.5

RANDOLPH, L. F. and

576.356.5:576.12

FISCHER, H. E.

633.15:576.356.4

**The occurrence of parthenogenetic diploids in tetraploid maize.**

Proc. Nat. Acad. Sci. Wash. 1939 : 25 : 161-64.

The authors obtained 23 parthenogenetic diploid and hyperdiploid plants among 17,165 offspring of autotetraploid maize. The chromosome number of 20 of these plants was counted; 15 of them had 20 chromosomes, 1 had 21, 3 had 22 and 1 had 24 chromosomes. The aberrant hyperdiploid plants furnish a readily available source of trisomic stocks which would be particularly valuable for genetic study if they were obtained from a uniform inbred tetraploid stock.

It is pointed out that these results indicate that tetraploidy is not necessarily an irreversible step in the evolutionary process, as has been generally thought.

1068. TAVČAR, A. 633.15-1.557:575-181.13:581.48:575:519.241.1

Visina biljaka, doba cvatnje i prirod zrna kod roditelja i  $F_1$  generacije u odnosu napram broju i duljini lisnih puči kod kukuruza. (**Height of plant, time of flowering and grain yield in the parents and  $F_1$  generation in relation to number and length of stomata in maize.**)

Arhiv Minist. Poljoprivrede, Beograd 1938 : 5 : Heft 11 : Pp. 17.

The author has already established the fact that number and length of aperture of the stomata are genetically conditioned characters. The results of crosses between *Zea Mays* var.



*indurata* x *Z. Mays* var. *indentata* showed that there was a definite correlation between number and length of aperture of the leaf stomata on the one hand and between height of plant and grain yield per plant on the other in the  $F_1$  generation, in comparison with the parental genotypes.

1069. ZUBER, M. S. and ROBINSON, J. L. 633.15.00.14:575(77.7)

**The 1938 Iowa corn yield test.**

Bull. Ia Agric. Exp. Sta. 1939 : No. 379 : Pp. 77.

A description of the extensive series of maize yield tests conducted in Iowa annually. The variety Pioneer Hi-Bred 349, a new hybrid released by the Pioneer Hi-Bred Corn Company, was particularly outstanding, yielding 20·38 bushels per acre more than the average of open-pollinated varieties in the northern section of the state. It had average stiffness of stalk and ear height and no dropped ears, but a higher than average moisture content of the grain and proportion of damaged kernels.

**BARLEY 633.16**

1070. SCHAD, C. and MAYER, R. 633.16:575(44)

Les orges du Puy. (The barleys of Puy).

Sélectionneur 1938 : 7 : 73-87.

The characters of the local populations of barley are described. The introduction of new varieties into the district has been a failure and now selections are being made of local types in the districts for which they are required.

1071. DMITRIEVA, T. I. 633.16:575(47)  
(The main results of breeding work with barley at the Kharkov station).

Selektsiya i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 12 : 4-7.

Data are given on the yields and other characteristics of various selections from the local barleys. Among the most promising hybrids referred to are a form combining large grain, smooth awns, high yield, increased earliness and a high degree of resistance to *Helminthosporium* obtained from the cross Medicum 026 x Nutans 0353/133; a form combining great luxuriance of growth with resistance to *Helminthosporium* obtained from the cross Medicum G.78 x Nutans 0353/133; and a naked form exceeding the standard varieties in yield, with strong straw and considerable resistance to *Helminthosporium* from Nudum 25-5 x 0353/133.

Crosses were made of parents of complementary phasic types according to Lysenko's principle and the progeny in 26 combinations out of 32 were earlier than or equal to the earlier parent. Wide segregation was observed in hybrids between Japanese and Abyssinian barleys and some of the segregates eared up to seven days before the earlier parent; increases in height of up to 13 cm., in length of ear of 1 cm. and in number of grains per ear of up to 14 were also observed.

Certain promising awnless forms have been obtained in crosses of *Hordeum sativum* var. *trifurcatum*.

1072. ROBERTSON, D. W. 633.16:575.116.4  
**Genetics of barley.**

J. Amer. Soc. Agron. 1939 : 31 : 273-83.

Present-day knowledge of linkage in barley is summarized and linkage maps are given for each of the seven known groups. In addition, brief descriptions are given of the characters determined by the mapped genes.

1073. KARPECHENKO, G. D. 633.16:576.356.5:581.036.1

**New tetraploid barleys—the hulled and the naked.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 59–62.

Single tetraploid plants of the varieties Colchicum 10 30 and Kolkhoz (the latter a new, naked two-rowed barley) were obtained by heat treatment closely similar to that described in "Plant Breeding Abstracts", Vol. IX, Abst. 746. The morphological changes induced by chromosome doubling resemble those previously recorded, though the changes in the different varieties differ quantitatively, e.g. in the Kolkhoz tetraploid, grain size is greatly increased, whereas the tetraploid grains of Colchicum 10 30 are only slightly larger than the diploid.

1074. SHANDS, R. G. 633.16–2.452–1.521.6:575.11(77.5)

**Chevron, a barley variety resistant to stem rust and other diseases.**

Phytopathology 1939 : 29 : 209–11.

The barley variety, Chevron, a selection from an unimproved variety obtained from Switzerland, is highly resistant to stem rust (*Puccinia graminis*). Genetical results are presented which indicate that this resistance, like that of the variety Peatland which was selected from the same parent material, is determined by a single dominant factor.

Chevron also shows fairly high resistance to scab (*Gibberella Saubinetii*).

The other important characteristics of the variety are described, including data relating to its resistance to various other plant diseases. It is concluded that Chevron forms useful parent material for use in barley breeding work for the upper Mississippi valley region.

### RICE 633.18

1075. OPSOMER, J. E. 633.18:575(67.5)

**L'amélioration du riz à Yangambi (Congo Belge). [The breeding of rice at Yangambi (Belgian Congo)].**

Agric. Elev. Congo Belge 1939 : 13 : 51–54.

Rice breeding at Yangambi began in 1933. It is cultivated under dry conditions and the species used is *Oryza sativa* L. var. *utilissima* Körn, group *communis* Körn. The aim is a hardy rice, high-yielding and of a sufficiently good quality for export. The conditions of anthesis are briefly noted and details are given of the technique of cultivation. A number of foreign varieties have been tested but none has proved satisfactory. Mass selection has improved the homogeneity of the crop and has eliminated the red grained strains. Details of the technique of selection are given. Crosses have been made and the progeny are now in the F<sub>3</sub>. It is hoped from these to obtain even better results than by selection.

1076. WULFF, A. 633.18:575.42(91)

**De rijstcultuur in Malaka. (Rice cultivation in Malaya).**

Landbouw 1939 : 15 : 101–35.

An outline is included on the development of rice selection in Malaya and the methods employed.

In general imported varieties have not given good results and work is now concentrated mainly on the selection of pure lines from the populations available in the country. Some hybridization work has, however, been begun and irradiation has been used as a method of inducing synchronous flowering in varieties differing in the length of their vegetation period.

1077. TAKAHASHI, H. 633.18:576.356.5:576.356.52

**(Rice plants grown from the seeds of haploid individuals).**

Proc. Crop. Sci. Soc., Japan 1936 : 7 : 355–63.

Observations on rice plants obtained from diploid x haploid individuals and from seed borne by haploid plants raised in experimental fields showed a rather low germination rate but normal growth, fertility and external appearance. All the plants investigated were found to have 24 chromosomes, thus indicating that reversion to the diploid condition had occurred. In the root tip of one plant an area containing tetraploid cells was found.

The writer found no evidence that 24-chromosome forms of rice were tetraploids.

## HERBACEOUS FORAGE PLANTS 633.2

1078. HAGERUP, O. 633.286:576.312.35:576.356.5  
**Studies on the significance of polyploidy. III. *Deschampsia* and *Aira*.**  
 Hereditas, Lund 1939 : 25 : 185-92.

*Deschampsia setacea* was found to be diploid ( $2n = 14$ ), whereas *D. flexuosa*, *D. caespitosa*, *D. arctica*, *D. pumila* and *D. bottnica* were tetraploid ( $2n = 28$ ) and the form of *D. alpina* studied was octoploid ( $2n = 56$ ). The diploid species has a much smaller ecological and geographical range than the tetraploids. The high chromosome number of *D. alpina* is accompanied by vivipary.

*Aira praecox* and *A. caryophyllea* are diploid ( $2n = 14$ ) and ephemeral, whereas *A. multiculmis* is tetraploid ( $2n = 28$ ) and is characterized by more vigorous growth and survives for a much longer period.

1079. CUGNAC, A. de 633.289:575.127.5:581.46  
 Sur un cas de dominance inconstante chez un hybride intergénérique de Graminées. (**On a case of variable dominance in an intergeneric hybrid of the Gramineae**).  
 C.R. Soc. Biol. Paris 1939 : 130 : 877-79.

The hybrid studied was *Agroelymus Piettei* A. de C. from the cross *Elymus riparius* Wieg. x *Agropyron caninum* R. et S. In the *Agropyron* parent the spikelets are solitary, in *Elymus* they are borne in twos or threes. Two types of ear were observed in the hybrid bearing a mixture of two and one spikelets and the other with only solitary spikelets. Each plant had about an equal proportion of the two types, the numbers for the second type being slightly lower. The double spikelets were mainly borne towards the base and lower third of the ear and it is suggested that nutritional factors may cause this arrangement. The theory is advanced that forms with similar mixed ears occurring in nature, such as *E. triticoides* Buckl. and *A. pseudo-agropyrum* Franch. may have had a hybrid origin.

1080. ARARATIAN, A. G. 633.289:576.312.35  
 633.289:575.12  
**(The chromosome numbers of certain species and forms of *Agropyrum*).**

Sovetskaja Botanika (Soviet Botany) 1938 : No. 6 : 109-11.

Chromosome counts were made on Armenian forms of *Agropyron intermedium* (Host.) P.B., *A. trichophorum* (Link) Richt., and *A. cristatum* (L.) Gaertn., all of which had  $2n = 42$ , except for one form of *A. cristatum* with  $2n = 28$ . Forms with  $2n = 14$  are also known and the different strains may represent "karyo-races" within the species or may constitute subspecies. Intermediate forms growing together with the above species had  $2n = 48$  and are possibly natural hybrids.

## LEGUMINOUS FORAGE PLANTS 633.3

1081. ODLAND, T. E. and 633.311:575.127.2:633.312  
 LEPPER, R. (Jr.) 633.311:581.45:575.11  
**A crinkled leaf mutation in alfalfa.**  
 J. Amer. Soc. Agron. 1939 : 31 : 128-30.

In an  $F_2$  raised from a cross between *Medicago sativa* and *M. falcata* there appeared 244 plants with normal leaves and 174 with crinkled leaves, the parents and  $F_1$  all having normal leaves. This is explained on a basis of three factor pairs, *D* and *E* being complementary dominant factors, the absence of either producing crinkling and *Cr* a dominant factor which produces crinkling except in the presence of *D* and *E*. The expected segregation is 37 normal to 27 crinkled, which the  $F_2$  figures fit very well.

Different degrees of crinkling are ascribed to modifying factors and incomplete dominance. The rather limited  $F_3$  results did not support the factorial explanation advanced and subsidiary hypotheses are proposed to explain this.

J. L. F.



1082. LEPPER, R. (Jr.) and ODLAND, T. E. 633.311:581.46:575.11.061.6  
633.311:575.127.2:633.312

**Inheritance of flower color in alfalfa.**

J. Amer. Soc. Agron. 1939 : 31 : 209-16.

From the  $F_2$  results of crosses of inbred strains of lucerne of different origins, with purple, white and yellow (*Medicago falcata*) flowers it is tentatively suggested that the following factors govern the production of these colours: *P* a dominant factor for purple, *C* and *A*, supplementary dominant factors for the production of colour and *Y* a dominant factor for yellow. In the absence of both *C* and *A* the flowers are white. Purple is epistatic to yellow. The inheritance of these factors was not extensively tested in the  $F_3$  generation.

The results of a cross involving variegation of flower colour are presented but no factorial explanation is given.

J. L. F.

1083. SENGBUSCH, R. v. and KRESS, H. 633.367:575.116.1.061.6:581.48:581.192.6  
Über das Auftreten zweier rezessiver Mutationen bei *Lupinus albus* in bestimmter Reihenfolge. (On the occurrence of two recessive mutations in *L. albus* in a definite sequence).  
Biol. Zbl. 1939 : 59 : 222-24.

At Petkus alkaloid-free mutants of *L. albus* were obtained in plant collections from Hungary, and at Müncheberg, in plants from Spain, Portugal, France, Italy, Egypt and Palestine. In all cases the alkaloid-free individuals had light seeds - light seeds being defined as pure white, and dark ones, as those having a white seed coat but with a reddish sheen.

The ratio of dark to light seeded plants ranged for the different collections from 100 : 1 to 1,000 : 1; and among the light seeded plants alkaloid-free individuals occur in a ratio of from 3,000 : 1 to 100 : 1. No alkaloid-free plants were ever observed among the dark seeded forms.

Crosses made subsequently at Petkus showed strong linkages between light seeds and the alkaloid-free condition on the one hand, and between dark seeds and the presence of alkaloid on the other, though a very few dark seeded alkaloid-free forms were observed, crossing-over between seed colour and the presence or absence of alkaloid amounting to only about 2 per cent. The writer suggests that, although possible according to the experimental results, practically speaking, the mutation from alkaloid-containing to alkaloid-free cannot occur until the mutation dark seeded to light seeded has taken place, and that certain definite relations must exist between the two gene pairs to render the occurrence of the alkaloid-free mutation possible only in a particular sequence.

The genetical implications of these findings are touched upon with reference to (1) the occurrence of mutations in new strains, (2) the possibility that in all the types of *L. albus* the alkaloid-free condition is caused by the same gene, (3) the possible relation between the light seeded mutation and the occurrence of various mutations for the alkaloid-free condition, and (4) to the chemical basis of the mutual reaction between the mutations affecting seed colour, the alkaloid content and an increased mutation rate.

1084. HACKBARTH, J. 633.367:581.162.32  
Ein Versuch über Fremdbestäubung bei zwei gelben Süßlupinenstämmen. (An experiment on cross-pollination in two strains of yellow sweet lupins).  
Züchter 1939 : 11 : 75-78.

Two strains, 8 and 80 of the yellow sweet lupin, *Lupinus luteus*, differing in their genes for alkaloid freedom and seed colour were used to test the amount of cross-pollination. A certain amount of cross-pollination occurs but not enough to reckon the yellow lupin as a cross-fertilized plant. Precaution must, however, be taken to prevent contamination with the bitter varieties.

Differences in the amount of cross-pollination were found between the two strains.

1085. CELICHOWSKI, K. 633.367:581.192.6:575(43-8)  
 Wyniki badań laboratoryjnych łubinów słodkich i niegorzkich ostatniego  
 sprzętu. (**Results of laboratory tests of sweet and non-bitter lupins  
 of last year's crop**).  
 Życie Rolnicze 1938 : 3 : No. 23 : 20-22.

The alkaloid content of a number of strains of yellow and blue sweet lupins was determined and the results are reported; the percentage alkaloid varied between 0.069 and 0.099 as compared with 0.98 per cent for the common yellow and 2.11 per cent for the ordinary blue lupin. *Lupinus hirsutus* contained 1.10 per cent, and as this species is useful both for grain and fodder, its further improvement by breeding is considered.

The yellow sweet lupins are richer than the blue by 10 per cent in protein, having an average protein content of 39 per cent in the seed. The germinating capacity of seeds in different samples varied from 20 to 99 per cent, the latter figure showing the possibility of attaining complete maturity under Polish conditions. The lower germination percentages are partly due to irregularity in maturity, which leads to some of the seed being harvested while still moist. Attempts are being made by the state research institute to breed forms with greater uniformity in ripening.

1086. KLINKOWSKI, M. 633.367-2.421.1-1.521.6  
 Mehltaresistente Lupinen. (**Mildew-resistant lupins**).  
 Züchter 1939 : 11 : 36-37.

An endemic race of yellow lupins collected in southern Portugal has proved resistant to mildew under conditions of both natural and artificial infection. There was some variation in the degree of resistance; some plants appeared to be completely immune, while others showed small, localized flecks of mildew.

#### ROOTS AND TUBERS 633.4

1087. KHARČENKO, N. V. 633.4:575:581.162.3:578.08  
 (**On a method of inbreeding fodder root crops**).  
 Trudy Sel'skokhozjaistvennoi Akademii im. K.A. Timirjazeva (Transactions  
 of the Timirjazev Agricultural Academy) Moscow 1937 : 2 : Part 3 : 95-101.

Fourteen varieties of root crops (nine of carrots, two of turnips and three of swedes) were used to ascertain whether the set from self-fertilization could be increased by dividing the plants to be used as pollinators into 2, 3 or 4 portions capable of independent growth and enclosing the various constituent portions of each plant together in separate isolators. It was found in all three species that "self"-pollination thus occurring among the constituent parts obtained from one root gave a higher set than was obtained by the ordinary process of selfing. By an appropriate method of bagging it was demonstrated that the increased set obtained in the experiment was due to acquired physiological differences arising in the course of development of the separate plant portions and not to the presence of a larger supply of pollen.

Observations also showed in the carrots that the tendency to self-pollination increased with the age of the umbel, the greatest number of seeds being obtained upon the latest formed umbels with axes of the third order. No such relationship could, however, be detected in pollinations occurring between axes of different orders, nor could any connexion be found between vigour and self-fertility.

As a practical means of increasing the set in carrots it is suggested that the surface moisture in the isolator should be removed by careful manipulation with absorbent cotton wool.

1088. ZOSSIMOVICH, V. P. 633.41:575.127.2:576.1  
 633.41:576.356.5  
**Interspecific hybridization in *Beta* L. I. Experimental synthesis and  
 origin of *Beta trigyna* W. et K. ( $2n = 54$ ).**  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 20 : 709-13.

Both tetraploid and hexaploid forms of the species *Beta trigyna* W. et K. are known. The hexaploid forms must, however, be regarded as typical, the tetraploid forms differing from

them in a number of morphological characters and in having a distinct geographical distribution. It is proposed to separate these tetraploids as a distinct species, *B. corolliflora*. The triploid hybrids *B. lomatogona* ( $n = 9$ ) x *B. corolliflora* ( $n = 18$ ) showed defective pollen and anthers and a low but variable fertility when back-crossed to the parent forms. The tetraploid hybrid *B. lomatogona* ( $n = 9$ ) x *B. trigyna* ( $n = 27$ ) was fertile, indicating that the chromosome set of the former species is homologous with one of those of the latter. An amphidiploid *B. lomatogona* x *B. corolliflora* with 54 somatic chromosomes was also obtained. This was phenotypically indistinguishable from *B. trigyna* and resembled it also in being self-fertile, whereas both parent forms were self-sterile. It is therefore considered that *B. trigyna* must have arisen in this way as a natural amphidiploid of *B. lomatogona* and *B. corolliflora*. Morphologically, it is intermediate between the two parental types. A map showing the geographical distribution of the *Beta* species of the section *Corollinae* Tr. is given.

1089. ZAIKOVSKAJA, N. E. 633.41:575.127.2:576.312:581.162.5

**Reduction division in interspecific hybrids in the genus *Beta* L.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 20 : 715-18.

Four interspecific hybrids are described. In  $F_1$  *Beta lomatogona* ( $n = 9$ ) x *B. trigyna* (tetraploid form,  $n = 18$ ) plants, the most frequent conjugation was  $9_{II} + 9_I$ , though 1-3 trivalents also occur in some cells. The anaphase separation is irregular. One plant regularly formed dyad pollen, whereas five others showed a highly irregular second division and formed very little viable pollen.

The hybrid *B. macrorrhiza* ( $n = 9$ ) x *B. trigyna* ( $n = 18$ ) had from 4 to 8 bivalents and from 10 to 19 univalents. One trivalent was observed in each of three cells. Both dyad and tetrad pollen grains were formed, and the proportion of good pollen was rather higher than in the above cross.

The  $F_1$  *B. macrorrhiza* x *B. lomatogona* hybrid showed 4 to 8 (usually 5 to 6) bivalents at diakinesis. The ensuing divisions are irregular and only a small proportion of good pollen is formed. *B. vulgaris* ( $n = 9$ ) x *B. lomatogona* behaves similarly, but has a modal number of 2 to 3 bivalents and even less good pollen is formed.

It is considered likely that in the above *B. trigyna* hybrids, the observed bivalents are the result of allosyndesis.

1090. OLSSON, P. A. 633.42-2.412.5-1.521.6:575(48.5)

Svalöf's Majrova. En rovsort, speciellt för odlingsområden där klumprotsjukan härjar. (Svalöf's Maj turnip. A variety specially for districts ravaged by club root disease).

Sverig. Utsädesfören. Tidskr. 1938 : 48 : 471-76.

The Maj turnip has proved extremely resistant to club root when grown on highly infected soils. It has a high yield capacity and is also recommended for cultivation under normal conditions.

1091. LIVERMORE, J. R. 633.491:519.241.1:575:578.08

**Correlation of seedling performance in the greenhouse and subsequent yield in the field.**

Amer. Potato J. 1939 : 16 : 41-43.

A study was made of the correlation between certain characters of some 2,000 potato seedlings grown in the greenhouse in their first year and their subsequent performance in the field. The characters studied were weight of tubers and height of plant in the greenhouse and weight of tubers and vigour of plant growth in the field. In general, correlations were not significant, the only exception being that between weight of tubers in the greenhouse and in the field. This correlation is attributed to the fact that the better yielding seedlings in the greenhouse tended to produce larger individual tubers, which gave slightly greater yields when planted out in the field.

It is concluded that the correlation between greenhouse and field performance is so slight that observations on seedling growth in the greenhouse are of very little use to the breeder who is searching for high-yielding lines.



1092. KRANTZ, F. A. 633.491:575(73)  
**Twenty-five years in the history of the potato.**  
 Amer. Potato J. 1939 : 16 : 25-31.

A brief review of the more notable advances in potato improvement which have been made during the last 25 years, with particular reference to the work done in the United States.

1093. 633.491:575.115:581.02  
 633.491-1.541  
 MAKSIMOVIČ, M. M.  
**(On new ways of breeding potatoes).**  
 Plodoovoščnoe Khozaistvo (Fruit and Vegetable Growing) 1938 : No. 12 :  
 5-8.

This paper consists mainly of a recapitulation of the views of Michurin and Lysenko and their followers upon the mutability of the gene in response to environmental influences. Data on the performance of intervarietal potato hybrids in the first and subsequent generations are interpreted as being in accordance with the above mentioned views.

In the author's opinion though hybridization will continue to be of value in potato breeding, full attention must be paid to environment and with special reference to providing suitable conditions for the expression of dominance of desirable characters. Moreover, the method of "vegetative hybridization" (grafting) must be widely applied.

The new methods advocated will necessitate individual care of the plants, which will be raised in relatively small numbers.

1094. \*BUKASOV, S. M. 633.491:575.127.2  
**(Interspecific hybridization in the potato).**  
 Bull. Acad. Sci. U.R.S.S. 1938 : 711-32.

The author emphasizes once again the difference between the *Andigena* group and *S. tuberosum*, the former group being short-day forms confined to the tropical belt. An outline is given of the present systematics of the potato, including the 18 new cultivated and 65 wild species and their ecological characteristics are indicated.

In order to investigate the value of the new material from the point of view of practical plant breeding hundreds of thousands of crosses have been made, 500 of which were interspecific; of these 200 were successful and produced offspring. All 15 diploid species even from widely separated systematic, ecological or geographical groups, are interfertile. The 10 triploid species rarely give results when intercrossed. The tetraploid species are interfertile when species belonging to closely related groups are crossed; chromosome duplication usually occurs in the production of such hybrids or their progeny. The male sterility of the two known pentaploid species has prevented their being crossed.

Crosses between species differing in chromosome number are usually successful if the chromosome numbers are multiples ( $2n = 24, 48$  or  $72$ ). The triploid species are very difficult to cross with other species. Of the pentaploid species one, *S. curtilobum*, crosses with the diploids and tetraploids, the other, *S. semidemissum*, does not. The hexaploid, *S. demissum*, will cross reciprocally with *S. tuberosum*.

In order to produce hybrids of good yield for European conditions they must always be crossed, often repeatedly, with *S. tuberosum*. Repeated back-crosses with the same cultivated variety have proved less vigorous than when a different variety is used each time.

Other methods used in breeding are intercrossing different  $F_1$  and  $F_2$  plants, back-crossing  $F_2$  plants, followed by further crossing with *S. tuberosum*, which according to Puškarev should be used as female parent. At each stage it is important to use for crossing the parents with the best combination of desirable characters and the highest capacity for transmitting them. Interspecific crossing often results in chromosome duplication on the part of one or both the parents. Examples of this are given. In the Pamirs chromosome duplication seems to be more frequent, possibly owing to the greater fall in temperature, a point that may be of some practical significance.

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\* An abridged translation of this paper is on file at the Bureau.

Hybrids between three or more species are also of interest; firstly, crossing with a third, bridging species is sometimes the only practical way of combining two species that do not cross directly. Or a third species may be used to introduce the "supplementary" yield factors absent in domestic varieties.

Many of the hybrids of the primitive species with domestic potatoes have given yields exceeding those of the latter, in some cases by 140–150 per cent, and many of these hybrids are thoroughly commendable varieties; some of which are being multiplied for general release.

1095. STEIN, W. 633.491:576.16  
Die Herkunftsprüfungen bei Kartoffeln. (**Provenance tests with potatoes**).  
Inaug.-Diss. Doktorw. h. Phil. Fak. Schles. Friedrich-Wilhelms-Universität,  
Breslau 1935 : Pp. 46.

The varieties are distinguished on the basis of their sprouts and a modified form of Bischoff's grouping has been used.

The effect of the provenance is studied in detail on sprouts, on the development of the plant and on yield. There is no question of an alteration of the type of sprout of a variety due to the provenance. The sprout formation of a variety appears to remain constant within a uniform ecological district.

The provenance tends to influence the yield as does the variety and the starch content appears to be partly dependent on the provenance.

1096. LEACH, J. G., 633.491–2.3:576.16  
DECKER, P. and  
BECKER, H. 633.491–2.3–1.521.6:575  
**Pathogenic races of *Actinomyces scabies* in relation to scab resistance.**  
Phytopathology 1939 : 29 : 204–09.

The occurrence of two distinct physiological races of *Actinomyces scabies* is reported, and the significance to the plant breeder of the occurrence of such physiological specialization is stressed.

1097. REDDICK, D. 633.491–2.3–1.521.6:575.127.2(74.7)  
**Scab immunity.**  
Amer. Potato J. 1939 : 16 : 71–76.

*Solanum Commersonii*, *S. chacoense*, *S. Caldasii* var. *glabrescens*, *S. Jamesii* and an unnamed form all appeared to be immune to *Actinomyces scabies* in field and greenhouse tests in two successive years. All of them have some very objectionable characters including late maturity, long stolons and, in the case of the first three, bitter flavour. Interspecific hybrids involving these forms have been obtained, but their usefulness in the production of commercially valuable scab resistant potatoes remains to be determined.

1098. LUNDEN, A. P. 633.491–2.412.5–1.521.6:575.11  
Immunitet mot krett (*Synchytrium endobioticum*) hos potet. [**Immunity to wart disease (*S. endobioticum*) in the potato**].  
Beretning om Nordiske Jordbrugsforskeres Forenings Sjette Kongres,  
Uppsala, Juli 1938. Nord. JordbrForskn. 1938 : Hefte 4–7 : 526–35.

Spieckermann and Kotthoff's method was used for the infection of the potatoes.

The material was grouped as follows:—(1) not immune, selfed or crossed with not immune; (2) immune, selfed; (3) immune x not immune or conversely, the material being divided into (a) segregating in the proportion 1 immune : 1 not immune; (b) segregating into more immune than not immune and (4) immune x immune which is further divided into (a) material segregating into 3 immune : 1 not immune and (b) segregating into more than 3 immune for each not immune.

The results, which are tabulated, are explained on the basis of three factors; X a dominant factor which determined immunity also in simplex ( $Xx3$ ) individuals; Y and Z complementary factors which can only cause immunity when both are present together. They are also

effective in the simplex ( $Yy3\ Zz3$ ) condition. They are independent of  $X$ . None of the not immune varieties have given immune plants among the progeny of selfs or crosses with not immunes.

The progeny of all the immune varieties and plants investigated for the inheritance of immunity to wart disease by selfing have segregated into a much larger number of immune than not immune. The numbers in nearly every case were very near to a 3 : 1 ratio. Experiments in which the variety Jubel has been used, have shown very diverse results.

No correlations were found between immunity to wart disease and other characters of the potato and no variety has been found which transmits immunity to all its progeny.

1099. STEVENSON, F. J.,  
SCHULTZ, E. S. and  
CLARK, C. F. 633.491-2.8-1.521.6:575.11

**Inheritance of immunity from virus X (latent mosaic) in the potato.**

Phytopathology 1939 : 29 : 362-65.

The inheritance of the immunity to potato virus X found in seedling 41956 was studied in crosses with the susceptible varieties Earleine and Katahdin and in families obtained from resistant selections from these crosses by self-fertilization. Thirty-seven per cent. of the progenies of the two crosses and from 72 to 78 per cent of the selfed lines were found to be immune. This can be explained on the basis of the usual type of inheritance in autotetraploids. It is assumed that the genes  $A$  and  $B$  are both necessary for immunity and that the immune plants studied have the formula  $AA\ aa\ Bb\ bb$  while the susceptible plants are  $aa\ aa\ bb\ bb$ .

1100. MILLER, J. C. 633.492:575:578.08  
**Comparative methods and techniques in sweet potato breeding in Louisiana.**

52nd Trans. Peninsula Hort. Soc. 1938 : 28 : No. 5 : 15-18.

The technique used by the author to induce flowering in sweet potato plants is described in detail (Cf. "Plant Breeding Abstracts", Vol. IX, Abst. 776). The technique used in hybridization is also described.

The major objectives of sweet potato breeding in Louisiana are (1) to breed a table variety with the general characteristics of the Porto Rico variety but with a more uniform shape combined with high carotin content and uniform flesh colour and (2) to breed a high yielding variety with a higher starch content than the present forms. In both cases, resistance to root and stem rots is desired.

1101. MENDIOLA, N. B. 633.492:575.252  
**A search for hidden and traumatic bud variations in sweet potato.**  
Philipp. Agric. 1939 : 27 : 726-54.

The variations occurring in plants raised from leaf cuttings are described and tabulated in some detail. It appears that the variations were not maintained in further vegetative propagations.

J. L. F.

1102. SIGEMURA, T.,  
TAKAHASI, T. and  
KAKIHARA, K. 633.492:581.143.26.035.1:575.12:578.08  
633.492:575(52)  
**(Sweet potato breeding by seeds, with artificial induction of blooming).**

Proc. Crop Sci. Soc. Japan 1938 : 10 : 281-96.

Plants of 27 sweet potato varieties were induced to flower in Chosen by growing them under artificial short day conditions, with a photoperiod of 8-10 hours. A large number of hybrids between these varieties were made in 1938. The seedlings showed many remarkable variations in leaf shape, habit of growth, colour and shape of tubers and many other characters.



# FIBRES 633.5

1103. POPEREKOV, M. 633.5:575.12:575.3  
(Apply the theory and methods of work of Dr T. D. Lysenko to work on flax and cotton).

Len i Konoplja (Flax and Hemp) 1939 : No. 1 : 6-12.

A brief outline of work at the Odessa Institute for Breeding and Genetics in which Lysenko's views on variation in pure lines and the effect of environmental factors on the genotype are recounted with observations on the applications of these theories in the work of the station.

1104. BOZA B., T. 633.51:575(85)  
El problema del algodón. (The problem of cotton).  
Bol. Minist. Fom., Lima 1938 : No. 14 : Pp. 12.

In a lecture on local cotton problems the speaker referred among other things to the merits of the variety Tangüis, to the fact that the organism to which it is resistant has now been shown to be *Verticillium* and not *Fusarium*, and to crosses that have now been made between Tangüis and Giza 7, which is also resistant to wilt.

1105. BOZA B., T. 633.51:575(85)  
Aspectos genéticos del algodonoero en Piura. (Genetical aspects of cotton in Piura). 633.51:575.127.2  
Inf. Minist. Fom. Lima 1938 : No. 48 : Pp. 12.

Crosses have been made between *Gossypium hirsutum* L. (var. Acala) and *G. peruvianum* (var. Tangüis, cleistogamous form).

Reference is made to two distinct types of Pima selected by Sr. Vega, one with erect habit and the other spreading, to a number of selections of Tangüis, including an early form, and to hybrids of Sakel x Pima, obtained from Kearney, which seem well suited to the locality. A protest is made against the current practice of mixing varieties, an improved system of seed selection proposed by the author is outlined and a list of the most pressing problems for cotton breeders is suggested. Collections are being made of the local cottons, *G. peruvianum*.

1106. BROWN, C. H. 633.51:575:578.08(62)  
Cotton-breeding technique as evolved at Giza.  
Bull. Minist. Agric. Egypt 1939 : No. 218 : Pp. 13.

An outline of the breeding methods used by the Botanical Section of the Egyptian Ministry of Agriculture.

1107. KEARNEY, T. H. and WEBBER, I. E. 633.51:575.127.2:575.11:581.4  
Morphology of two American wild species of cotton and of their hybrid.  
J. Agric. Res. 1939 : 58 : 445-59.

Descriptions are given of the gross morphology and of the anatomy of the mesophyll and petiole of the parents,  $F_1$  and  $F_2$  of the cross *Gossypium Armourianum* x *G. Thurberi*. The ratios observed in  $F_2$  for some of the more striking contrasting characters are given. In only one case was a simple Mendelian segregation observed—a 1 : 2 : 1 ratio for circular v. quadrangular cross-section of the twigs. In most cases the dominant characters were those of the *G. Armourianum* parent.

In the  $F_2$  it appeared that the dominance tendencies of the characters petal spot and pollen colour were reversed, as compared with the position in intraspecific crosses; the populations were, however, too small to warrant a definite conclusion.

The possible physiological advantages of the compact mesophyll of *G. Armourianum* are discussed, with reference to their importance in plant breeding.

1108.

633.51:576.16

WEBBER, J. M.

633.51:575.127.2:576.354.4:581.162.5

**Relationships in the genus *Gossypium* as indicated by cytological data.**

J. Agric. Res. 1939 : 58 : 237-61.

The cytogenetic literature which has a bearing on the relationships between species of *Gossypium* is summarized in tabulated form, and the meiotic chromosome conjugation in the  $F_1$  of 23 new interspecific hybrids, as well as in the  $F_2$  and  $F_3$  of some of these hybrids, is reported. These results strongly support the following grouping of species: (1) the Australian species, *G. Sturtii*, (2) Asiatic species, (3) wild American species and (4) cultivated American species.

The small amount of chromosome conjugation in *G. Sturtii* hybrids indicates that there is very little chromosome homology between it and other species, with the possible exception of *G. Davidsoni*.

Chromosome behaviour in crosses involving Asiatic species indicates (1) that the cultivated Asiatic species are very closely interrelated; (2) that the wild African species *G. anomalum* is rather closely related to the cultivated Asiatic species; (3) that the wild Asiatic species *G. Stocksii* is not closely related to the cultivated species or to *G. anomalum*; (4) that of the Asiatic species the cultivated ones are most nearly related to the cultivated American species, *G. Stocksii* is most distantly related and *G. anomalum* occupies an intermediate position; and (5) the Asiatic species are not closely related to the wild American species.

The wild American species appear to fall into two, or possibly three, sub-groups, the inter-relationships of which are discussed. *Erioxylum aridum* should probably be included in the genus *Gossypium* in the sub-group that also contains *G. Thurberi*. It appears that the chromosomes of these species and those of the Asiatic species are homologous with different sets of 13 of the cultivated American species.

The relationship of *G. Davidsoni* and *G. Klotzschianum* to either *G. Stocksii* or the cultivated American species is unknown.

The various cultivated American species are closely inter-related. The chromosomes within their haploid complement are partly homologous, whereas such homology is absent or very slight in all the 13-chromosome groups.

Various hypotheses as to the origin of the 13- and 26-chromosome *Gossypium* species are advanced and discussed.

1109. MAUER, F. M.

633.51:576.16:575.127.2

633.51:576.16:575.129:576.356.5

**[On the origin of cultivated species of cotton. A highly fertile triple hybrid (*G. barbadense* x *G. Thurberi* Tod.) x *G. arboreum*].**

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 695-709.

The author reaches the conclusion that the "tetraploid" cottons originated at a very distant period, probably long before being taken into cultivation. The extreme genetic differences that exist between the individual species of the "tetraploid" group suggest that they arose independently from crosses between different diploid species; their geographical distribution supports this view. None of the existing diploid species has chromosomes that are homologous with those of any tetraploids and it seems clear that at the time when the tetraploid species arose the whole specific composition and distribution was quite different from those of the present day, and that the original parent species no longer exist.

In an attempt to throw light on the subject various crosses were made as follows: (1)  $F_1$  *G. arboreum* x *G. Thurberi* was crossed with *G. arboreum* and selfed in the hope of producing triploids and amphidiploids: the resulting hybrids were also crossed with *G. barbadense*; (2)  $F_1$  *G. barbadense* x *G. Thurberi* was crossed with *G. arboreum* and *G. herbaceum*; (3)  $F_1$  *G. barbadense* x *G. Armourianum* and  $F_1$  *G. hirsutum* x *G. Armourianum* were crossed with *G. herbaceum* and *G. arboreum*.

In the cross (*G. barbadense* x *G. Thurberi*) x *G. arboreum* six hybrids were obtained, three being highly fertile and three partially so. One plant was particularly fertile, vigorous and abundant in flower and fruit production; its flowers strongly resembled those of *G. barbadense* in colour and size, except that the stamen filaments were somewhat longer. The pollen was copious,

large, yellow in colour and almost all perfect as judged by acetocarmine. The plant itself also resembled *G. barbadense*, the leaves being somewhat more dissected, and the bolls were almost identical with those of the wild forms of that species. The seeds were small, very slightly pubescent, with fine soft lint, very strong and up to 45 mm. in length. Meiosis in the hybrid was regular and 26 closed bivalents were present; it had clearly arisen from an unreduced egg cell of the female parent and contains the full genomes of all three species, thus (*G. barbadense* 26<sub>r</sub> + *G. Thurberi* 13<sub>r</sub> + *G. arboreum* 13<sub>r</sub>) = 26<sub>n</sub>. In the first metaphase 13 small and 13 slightly larger bivalents could be distinguished; it thus supports Skovsted's conclusion that *G. barbadense* consists of one chromosome set of *G. Thurberi* and one of *G. arboreum*, or at least species of which these are the nearest surviving relatives. This view is supported too by the genetic behaviour of the hybrid *G. Thurberi* x *G. arboreum*, e.g. the dominance of the glabrous stem and leaf, the extrafloral nectaries and absence of fused bracts, all characters of *G. Thurberi*, and of the wide cordate leaf, dentate bracts, internal nectaries, yellow petals, stamens and pollen, clearly defined petal spot pitted and glandular nature of the bolls characteristic of *G. arboreum*. This combination of characters is strongly reminiscent of *G. barbadense*. It is possible that the original form differed from the present-day *G. Thurberi* in having yellow flowers and less dissected leaves with broader lobes, in these respects being somewhat more similar to *G. Armourianum* or *G. Harknessii*, and may in fact have been the forebear of these three species, which are undoubtedly altered in both distribution and genetic constitution. It is to be expected that amphidiploids of *G. arboreum* x *G. Thurberi* if obtained would fit into the existing species *G. barbadense* and serve to extend its range of variation; they might hence be of great practical breeding value; for instance the introduction of characters such as the earliness, resistance to gummosis and tolerance of *G. arboreum*, and the cold resistance, resistance to wilt and gummosis, vigorous root system and prolific fruiting of *G. Thurberi* into *G. barbadense* would create immense possibilities in the improvement of this species.

Other triple hybrids of the type referred to above are expected to have a similar practical interest.

1110. SHEN, T. H. 633.51:581.143.26:575(51)  
**Perennial cotton in south western China.**  
 New Economist 1938 : 1 : No. 2 : 48-52.

Four distinct types of perennial cotton found by the author at Kaiyung, Yunnan province, China, are described. All these types were superior to annual cottons in vigour, yield and quality. It is therefore suggested that in breeding new cottons for sub-tropical conditions in south-western China, stress should be laid on developing perennial types of Egyptian, Sea Island and American Upland cottons rather than annual types.

1111. STEYAERT, R. L. 633.51-2.422.3-1.521.6:575.42  
 La sélection du cotonnier pour la résistance aux stigmatomycoses. (The selection of cotton for resistance to stigmatomycoses).  
 Publ. Inst. Agron. Congo Belge 1939 : Sér. Sci. No. 16 : Pp. 29.

This complex disease is caused principally by *Nematospora coryli* Peg. and *Ashbya gossypii* (A. et N.) Guill. and several hemipterous vectors. Several lines already purified for economic characters were chosen and selections were made on the results of inoculations. Certain sub-families of 145 have shown resistance to the disease and other lines are of interest.

1112. MOORE, J. H. 633.51:677.1:519.241.1:575  
**The relation of certain physical fiber properties in improved cotton varieties to spinning quality.**  
 Tech. Bull. N.C. Agric. Exp. Sta. 1938 : No. 58 : Pp. 58.

It is concluded in this progress report that the plant breeder should select American upland cotton strains for the following characters if increased spinning value is desired: longer staple, smaller diameter of fibre, relatively high fibre weight in strains having similar fibre diameters and a reasonable amount of strength.



1113.

633.513:575(59.7)

Le kapokier en Indochine. (**Kapok in Indo-China**).

Rev. Int. Prod. Colon. 1938 : 13 : 281-87.

La culture du kapokier à la Station de Giaray. (**The cultivation of kapok at the Station of Giaray**).

Ibid. 1938 : 13 : 288-92.

In the first paper the data given include the area under kapok cultivation in Cambodia and Cochin China, the increase in export since 1924 and varieties in the collection are listed.

Research stations have been established at Giaray, and Ong-Yém for the improvement of kapok. Foreign varieties have been introduced and selection and hybridization are in progress.

The second paper deals specially with the work on kapok improvement at the experiment station of Giaray.

Experiments are being made with importations from Togoland and Java as well as with local species.

The variety from Togoland is of interest on account of its hardiness, rapid growth, large non-dehiscent capsules and high yield. But though the fibre is long the greyish colour is not desirable.

Selection is in progress to improve the colour of the fibre and to increase the number of plants with non-dehiscent fruits and with smooth stems.

Artificial self and cross-pollinations have been made with success and the behaviour of grafted trees is being studied.

1114. Sizov, I.

633.52:575(47)

(**Immediate problems in breeding and improving varieties of flax**).

Len i Konoplja (Flax and Hemp) 1938 : Nos 8-9 : 56-58.

A criticism of prevalent methods of flax improvement in the U.S.S.R. with suggestions for remedying defects and improving organization, especially as regards variety trials and seed production. The ideal to be aimed at is the production of varieties combining high yield and quality of both fibre and seed with other economic characters, including resistance to cold and drought. The value of intervarietal crossing, in which existing good pedigree varieties could be used, is stressed.

1115. Sizov, I.

633.52:575-184:581.44

(**Flax breeding news**).

Len i Konoplja (Flax and Hemp) 1939 : No. 1 : 54-55.

The All-Union Institute of Plant Industry has experimented in crossing fibre forms of flax and other types with many stemmed forms of the kind cultivated in Azabaijan and other parts of the U.S.S.R. and also found in Turkey, Afghanistan and Western China. In one series of crosses the varieties DS30 and DS33 were used as the fibre type parents and were crossed with a semi-winter Azerbaijan type which is characterized by basal branching of the stems. Hybrid lines of the fourth and fifth generations have been raised. The new forms range from 115 to 125 cm. in height and have 3-5 stems, all of approximately the same quality, on one root. The length of utilizable fibre of the stems is 90-95 cms. Sown in nursery plots about 10-12 seed capsules per stem were formed and the individual plants had up to 50-60 capsules each.

The hybrid lines raised in 1938 were uniform, were not segregating and attained 125 cm. in height under field conditions. The elimination of the only undesirable quality, lateness, is to be the next step in the development of the desired type of flax of high yield and quality.

1116.

633.52:575.127.2

GAJEWSKI, W.

633.52:575.11:575.182:581.162.51

**A contribution to the knowledge of the cytoplasmatic influence on the effect of nuclear factors in *Linum*.**

Acta Soc. Bot. Polon. 1937 : 14 : 205-14.

A form of flax obtained under the name *Linum floccosum* proved to be identical in type and

in breeding behaviour with the procumbent flax of Bateson and Gairdner (1921). In crosses with *L. usitatissimum* it gave a 3 : 1  $F_2$  ratio for normal v. male-sterile when used as the female parent, and only normal plants when used as the male parent.

*L. angustifolium* x *L. usitatissimum* and *L. floccosum* x *L. angustifolium* crosses and their reciprocals all gave entirely normal progeny. Male-sterile plants, when crossed with *L. angustifolium*, gave  $F_2$  ratios of 3 normal : 1 male-sterile.

The genetic interpretation of these facts is as follows: *L. floccosum* (which is in reality a variety of *L. usitatissimum*) contains the dominant factor *M* for normal type (not male-sterile). Other *L. usitatissimum* varieties carry the recessive factor *m* for male-sterile and also a cytoplasmic factor which suppresses its action, so that the flowers are hermaphrodite. The cytoplasm of *L. floccosum* does not have this inhibitory action on the factor *m*. The present results show that *L. angustifolium* possesses the factor pair *MM* in addition to cytoplasm of the *L. usitatissimum* type.

1117. RYBIN, V. A. 633.52:576.356.5:581.04  
**Colchicine-induced tetraploidy in flax.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 302-06.

Tetraploidy was induced in flax plants by immersing growing shoots in 0.1 per cent colchicine solution for 25 hours. The exact technique used and the characters of the resulting plants are described in detail.

1118. LUTKOV, A. N. 633.52:581.04:576.356.5  
**Mass production of tetraploid flax plants by colchicine treatment.**

C.R. (Doklady) Acad. Sci. 1939 : 22 : 175-79.

Numerous tetraploid plants, in addition to various chimaeras and some plants which were sterile and apparently octoploid, were obtained by treating germinating seeds or the growing tips of flax plants of fifteen cultivated varieties and three wild species with colchicine. The proportion of tetraploids obtained was in all cases high.

Experiments have now been undertaken to produce amphidiploids from *Linum perenne* x tetraploid *L. usitatissimum*. A study of the technological qualities of tetraploid fibre flax is also being made.

1119. KAČISKIN, M. 633.522:575(47)  
**(My work with hemp).**

Len i Konoplja (Flax and Hemp) 1938 : Nos 8-9 : 59-61.

Early flax variety trials and flax improvement in Russia are mentioned with special reference to the work of the Lunino Experiment Station on the production of a southern type of hemp that would not fail to ripen in more northerly regions. Mass and individual selection were used at first, but later, hybridization with wild forms to increase hardiness and earliness was successfully undertaken. The work is not yet completed but data are given of the comparative performance of the local types and the new forms as regards development up to flowering time and their yield. Defects still present in the new forms are late maturity, non-synchronous ripening of the male and female plants and susceptibility to insect damage. Future breeding should aim at ensuring high yield in forms from which the above defects shall have been eliminated.

1120. DOOP, J. E. A. den 633.526.23:581.162:575.242:577.17  
 Nicht-blühende Sisalpflanzen. **(Non-flowering sisal plants).**  
 Faserforschung 1939 : 14 : 9-27.

The occurrence of non-flowering plants of sisal in Java and Sumatra is described and discussed. The suggestion is advanced that the non-flowering plants are mutations derived from the normal type and involving the loss of the hormones responsible for flowering.

## SUGAR PLANTS 633.6

1121. MANGELSDORF, A. J. and 633.61:575(96.9)  
LENNOX, C. G. 633.61:575:578.08

### Genetics.

Report of committee in charge of the Experiment Station, September 30, 1937 : 35-46. Contained in Proc. 57th Annu. Mtg Hawaii. Sug. Pl. Ass. (1937) 1938.

Efforts are being made to combine high sucrose content with eye spot resistance and ability to "carry over" in sound condition. For this purpose many crosses were made between soft, high sucrose canes and hard, eye spot-resistant *robustum* quarter-breeds.

Certain new experimental crosses which were found to produce superior seedlings are listed. In the season 1936-37, from two to four million seedlings were grown. Of these, only some 68,000 could be space-planted, owing to restrictions of space. Instead of discarding the rest, it was decided to plant them in bunches of 20 to 30 seedlings, the bunches being spaced three or four inches apart. In this way the weaker seedlings will be crowded out and further selection may be carried out on the survivors.

The technique of testing regional strains has been modified slightly, a preliminary field trial being carried out before the first and second field trials.

Many new seedlings were studied to determine their resistance to drought, eye spot disease, *Pythium* and leaf scald.

In the case of eye spot disease and *Pythium* attack, experiments are being carried out to determine to what extent resistance in the young seedlings is correlated with mature plant resistance.

Observations on the hardness of the rind of new varieties are also made.

The results of an expedition to the East Indies to collect wild *robustum* canes are reported.

1122. MORIYA, A. 633.61:575.127.2:633.174:576.312.35  
(Cytogenetical studies on sugarcane-sorghum hybrids).

Jap. J. Genet. 1938 : 14 : 268-69.

The sugar cane variety POJ 2725 ( $2n = 107$ ) was crossed by 3 types of sorghums distinguished by the author as "morokoshi (Indian millet), sugar morokoshi and sorghum" respectively, all of which had  $2n = 20$  and  $n = 10$ . Normal, intermediate and dwarf types of  $F_1$  plants were obtained and the first two are discussed. Root-tip counts in normal type  $F_1$  plants showed about 118 chromosomes which is interpreted as being the sum of the somatic number of POJ 2725 and the haploid chromosome number of morokoshi. In the intermediate type  $2n$  was about 64, i.e. the sum of the haploid numbers of both parents.

If the haploid numbers for sugar cane and morokoshi be termed  $C$  and  $S$  respectively, the author believes that strains with a  $2C + 1S$  structure (i.e. normal type strains) are much more suitable for breeding purposes than  $1C + 1S$  types and the still less desirable  $1C + 2S$  type plants obtained in India by back-crossing  $F_1$  hybrids ( $2n = 63-64$ , i.e.,  $1C + 1S$  in type) to morokoshi.

The problem for the breeder is therefore how, by means of a suitable  $C : S$  ratio, to obtain a strain with a large yield and rapid growth.

1123. CLAUS, E. 633.63:575(43)  
Die Zuckerrübenzüchtung von heute. (The sugar beet breeding of to-day).

Zbl. Zuckerindustr. 1938 : 46 : 905-09.

A lecture outlining the present position of sugar beet breeding in Germany.

1124. 633.63:575.127.2:633.41  
SAVITSKY, V. F. 633.63:576.16  
(Hybrids of beet with mangolds and the problem of synthesis of the sugar beet).

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 643-62.

Investigations of a number of races of Swiss chard have shown that some of the primitive



ances of green chard are the most promising for crossing for the increase in sugar content; a great variety of races exists as regards the leaf characters, the roots being more or less uniformly of the type of the western European forms of *Beta maritima* L. The green races are all more highly yielding than the pigmented races, which are products of hybridization between the green chards and table beet.

Crossing these chards with forage beets, the result varies enormously according to the particular race used in both parents but more particularly of the chard, which varies very widely in sugar content, the best being superior to semi-sugar beet and to all other types of beet. The sugar beet, in addition to its superior sugar content, is also more constant under variations of climatic and other conditions. Hybrids of sugar beet and green chard are fairly high in sugar content, being only 1 or 2 per cent below the average sugar x sugar beet hybrid and not infrequently higher; they are generally well above the mean for the two parents. The later generations maintain this high sugar content, which is found also in the back-crosses with sugar beet; it is found also in brother x sister matings and is thus not an expression of heterosis. It would appear that the green chard contains all the main genes for sugar content present in the sugar beet and its lower sugar content is the result of the absence of the necessary modifiers, which have been accumulated in the sugar beet after many generations of selection. Disturbance of this system of modifiers, e.g. by inbreeding or by crossing, invariably reduces the sugar content, which can however be restored again by prolonged selection, as shown by Grinko in the production of high sugar self-fertile strains of sugar beets by inbreeding.

In consequence of the above, many hybrids between forage or table beet and chard have proved almost identical with hybrids of fodder beets and sugar beets. Thus in 1935 the sugar content of sugar beet was 20 per cent, that of the  $F_1$  forage x semi-sugar 11 to 14 per cent, of the chard 13.5 per cent, of sugar x forage beet 14.6 to 18.2 per cent and of fodder beet x chard 14.6 to 18.6 per cent. Similarly, at the Uladov station in 1933 the sugar beet had a sugar content of 16 per cent, the  $F_1$  sugar beet x white chard 12 to 15 per cent, sugar beet x yellow or red chard 8.8 to 12 per cent,  $F_1$  hybrids of sugar beet with various fodder, table and semi-sugar beets 10 to 14 per cent, hybrids of chard with table, fodder and semi-sugar beets 10 to 14.5 per cent and  $F_1$  hybrids of various crosses between fodder, semi-sugar and table beets 8 to 11 per cent. These figures illustrate the similarity of the hybrids of chard and of sugar beet.

The chard was therefore used for crossing with  $F_1$  hybrids of sugar beet with fodder or semi-sugar forms, which often raised the sugar content beyond the average for the two parents; the results were indeed very similar to those of back-crossing to sugar beet.

A study has been made of the  $F_2$  of the cross of fodder beet x chard. These hybrids varied in sugar content from 9 to 21 per cent in 1935 when the  $F_2$  sugar (high yield) beet Kharkov x sugar beet Kal'nik varied from 18 to 23 per cent, the  $F_2$  semi-sugar x Roter Obendorf fodder beet varied from 3 to 12 per cent and the  $F_2$  between the two sugar beets with the highest sugar content from 12 to 18 per cent. The  $F_2$  sugar beet x fodder beet varied from 18 to 22 per cent. Thus the chard x fodder beet  $F_2$  produced forms almost equal to any as regards sugar content, which can be regarded as a successful attempt to synthesize the sugar beet. This result was confirmed in 1936, when again by this single cross forms were produced which were equal in sugar content to those that have required scores of years to build up. Thus in a year when the average sugar content of sugar beet was 16 to 17 per cent, the back-cross of chard x table beet hybrids with sugar beet had a sugar content of 15 per cent, whereas the  $F_2$  hybrid of the small yellow sugar beet, which is equal to the chard in sugar content, with fodder beet had only 10.8 per cent sugar.

A study of the later generations of these crosses indicates that the chard contains a number of modifiers of sugar content different from the modifiers present in sugar beet and that combinations of these are possible which lead to still more favourable conditions for sugar formation and thus an increase in sugar content over that of the sugar beet. The same is true in almost equal degree of the wild western European races of *B. maritima*, hybrids of which with fodder beets have produced forms approaching sugar beet in sugar content.

From the above results the author concludes that the sugar beet is more closely related to the wild beet than are the other cultivated beets; it almost certainly had its origin in hybrids of the primitive European green chard, which is closest to the wild *B. maritima*, with forms

of the common forage type, thus furnishing the basis on which selection worked in the production of the modern sugar beet. The newly obtained hybrids, if obtained on a large scale, should furnish an equally valuable starting point for further selection.

1125. COLIN, H. and BOUGY, E. 633.63:575.127.2:633.416  
Hybrides de première génération.  $F_1$  entre sucrières et fourragères.  
(Hybrids of the first generation.  $F_1$  between sugar and forage beets).  
Publ. Inst. Belge Amélior. Better. 1938 : 6 : 471-76.

Data are given on the  $F_1$  of the following crosses between the sugar beets Vilmorin A and Kuhn and the forage beet Mangold: Vilmorin A x Mangold, Kuhn x Mangold and Mangold x Kuhn. Most of the characters were intermediate. In the last cross there was a definite lowering of the sugar content. Previous crosses had given quite different results and whether this is due to chance variations or whether it is a question of different races is left undecided.

1126. COLIN, H. and BOUGY, E. 633.63:575.42  
Une sélection laborieuse. (A laborious selection).  
Publ. Inst. Belge Amélior. Better. 1938 : 6 : 465-70.

Some hybrids of Géante blanche x Vilmorin A were accidentally crossed with *Beta maritima* in the  $F_3$ . Data are given on the fourth generation of these hybrids when the sugar content varied only between 16.5 and 18.

The root shape of the hybrids was most irregular and it is clear that it is easier to recover the high sugar content than regularity of shape from such hybrids.

1127. RASMUSSEN, J. and LEVAN, A. 633.63:581.04:576.356.5  
Tetraploid sugar beets from colchicine treatments.  
Hereditas, Lund 1939 : 25 : 97-102.

The apices of shooting flower stalks of sugar beet were immersed in 1 per cent colchicine solution for 24 to 48 hours. The tissues actually immersed were too severely damaged by the treatment to give viable pollen, but the drug was translocated down the stem for some distance and lateral branches which were wholly or partly tetraploid were formed below the immersed region. Several treated plants were allowed to interpollinate, the diploid flowering shoots being removed. Seed was produced plentifully and of the first sample of seedlings examined, 3 were tetraploid, 13 triploid and 58 diploid. Two of the autotetraploid plants show normal vigour and apparently grow at the same rate as the diploids.

1128. COLIN, H. and VIDAL, J. 633.63:581.466  
Statistique relative au nombre des lames stigmatiques dans une variété sucrière. (Statistics relating to the number of stigmatic lobes in a sugar beet variety).  
Publ. Inst. Belge Amélior. Better. 1938 : 6 : p. 575.

It is suggested that it might be of interest to know whether the variation in number of stigmatic lobes is the rule or the exception in the different kinds of beet.

1129. SCHNEIDER, F. 633.63-1.557:575  
633.416-1.557:575  
Etudes sur les betteraves fourragères et sucrières. (Studies on forage and sugar beets).  
Publ. Inst. Belge Amélior. Better. 1938 : 6 : 575-76.

Comparative tests involving a large number of sugar beet and forage beet varieties were carried out. The amount of variability in yield was not distinctly different in the two types

of beet, but the forage beets showed a greater variability in dry matter content as determined by the refractometer than did the sugar beets. The possibility is suggested that the lower variability in the sugar beet is due to the presence of a larger number of genetic factors influencing sugar content, so that the loss of a single factor would have a relatively smaller effect.

1130.

633.63-2.8-1.521.6:575(73)  
633.63:581.143.26:631.521.6:575

OWEN, F. V., et al.

**Curly-top-resistant sugar-beet varieties in 1938.**

Circ. U.S. Dep. Agric. 1939 : No. 513 : Pp. 10.

Further progress has been made in the production of sugar beet varieties highly resistant to curly top, by mass selection of the variety U.S. 1 (Cf. "Plant Breeding Abstracts", Vol. VII, Abst. 255). Two new varieties, U.S. 12 and U.S. 14 are described here. The former has high resistance and outyields U.S. 33 and U.S. 34 under conditions of heavy curly top exposure. Its bolting tendency is more uniform and slightly lower than the last named two varieties, but sufficiently high to make the variety unsuitable for autumn sowings in California.

U.S. 14 is characterized by low bolting tendency. Its curly top resistance is lower than in U.S. 12 and about equal to that of U.S. 1. It is rather susceptible to downy mildew. It was derived from strain 5001, one of the parental strains combined to produce U.S. 1. The behaviour of U.S. 33 is described in comparison with the U.S. 12 and U.S. 14.

The danger of unconsciously selecting for high bolting tendency by producing seed in mild climates is stressed.

New breeding work is in progress with the aim of producing beet strains resistant to both curly top and downy mildew.

**STIMULANTS 633.7**

1131. ARGHIRESCU, V. 633.71:575(49.8)

Tutunul Ialomița. (**The Ialomița tobacco**).

Bul. Cultiv. Ferment. Tutun. 1939 : 28 : 3-11.

A description of the indigenous variety, Ialomița, derived from the variety, Kerty or Gartenblätter, and used for the manufacture of cigarette tobacco.

1132. GARCÍA FORTUÑO, M. 633.71:575(72.95)

Apuntes sobre la genética del tabaco. Descripción del método de cruzamientos utilizado por el Instituto del Tabaco. (**Notes on tobacco genetics. Description of the method of crossing employed by the Tobacco Institute**).

Rev. Agric. P. Rico 1939 : 31 : 39-41.

In breeding tobacco it is important to bear in mind that quality is the main factor which must not on any account be lost in making crosses for increased disease resistance or other desired properties. The necessity of making selections under the same conditions as those for which the crop is designed is also emphasized and the technique of hybridization is described.

1133.

633.71:575(92)  
63.0015(92)

Bezoek van den Gouverneur-Generaal aan het Besoekisch Proefstation te Djember. (**Visit of the Governor General to the Besoeki Experiment Station at Djember**).

Bergcultures 1939 : 13 : 428-34.

An account was given of the work of the station on tobacco and other crops. A special address by R. van der Veen briefly outlined the development of tobacco selection, the recent inclusion of the production of cigarette tobacco in the research programme being mentioned.



1134. JACOB, J. C. s' 633.71:575(92)  
 Resultaten van eenige brandselectieproeven bij Besoeiki tabak. (**Results of some selection tests for burning property in Besoeiki tobacco**).  
 Meded. Besoek. Proefst. 1937 : No. 58 : 1-16.

During 1931-36 strains of Kedoe 103, of Hybrids 272 and 344 and of Kedoe LMSA have been tested in various years to ascertain the effect of selection for burning property.

In general, selection appears to have had no great effect. The best results were obtained with LMSA Kedoe, a population, and therefore possibly better material for selection. In no kedoe strains, however, were marked genetical differences found in burning properties. The hybrid lines on the other hand do show definite differences in this respect and in other qualitative characteristics.

In spite of the poor results hitherto obtained selection for burning time is to be carried out in future with all new kedoe and hybrid strains, though better results have already been obtained by the control of the environmental conditions which have been shown to affect burning time.

The reliability of burning tests and the variability of burning time in tobacco are discussed.

1135. \*COOLHAAS, C. 633.71:575(92.2)  
 Proefstation voor Vorstenlandsche Tabak. Jaarverslag Oogstjaar 1936-1937. (**Experiment Station for Vorstenland Tobacco. Annual report—Harvest year 1936-1937**).  
 Meded. Proefst. Vorstenl. Tab. Klaten (Java) 1938 : No. 85 : Pp. 83.

Some selections of Deli-Vorstenland hybrids (D1-2K) in the  $F_7$  were of very good quality and selection is still being continued. The  $F_7$  of the Deli-2K cross has been once again crossed with Kanari (D1-3K) to eliminate the lack of uniformity in the leaf, and especially the lower leaves, while retaining the exceptionally fine venation found in the Deli hybrids; the  $F_2$  of this D1-3K is to undergo further selection in 1937-38.

In the Kanari crosses (KK) line KK63 (in the  $F_8$ ) has reached the stage when no further selection is necessary and it can now be included in a large number of variety trials.

At Methook the  $F_9$  progeny of line E3K 1819 (a selection from sibs of E3K 57) have done well and two plots in particular derived from a single plant in E3K 1819 have been outstanding. Variety trials next year will include E3K 1819.

Selection in sibs of E3K 57 has not yielded plants of such good quality but the progeny of two good plants is to be further investigated.

At Djombor neither E3K 57 nor E3K 66 gave better results than the control KW 10.

In the  $F_7$  from back-crosses of the *Phytophthora* resistant Timor with Vorstenland strains, in two plots a very large number of plants were chosen for good leaf shape, venation and leaf colour and any  $F_8$  plants which appeared resistant to *Phytophthora* are being used for further work.

The quality of these Timor-Vorstenland-Djombor strains appears to be the best in the whole plantation and even if they should be found lacking in resistance to *Phytophthora* in variety trials, they will be continued on account of their quality.

Selection in E x KBS, old Kanari, old  $Y_{10}$  (progeny of  $Y_{10}$ -Lodewijks),  $Y_{10}$  x Kan. and  $Y_{10}$  x  $Y_{10}$  is being continued.

The  $F_2$  plots of Kanari x Kedoe and the reciprocal yielded a tobacco of satisfactory quality with marked aroma. Some selected  $F_2$  individuals are being carried on as well as the back-crosses of Kedoe x Kanari and of Kanari x Kedoe to Kanari.

The selection Kanari x Wonosobo produced no valuable results.

The Kanari type individuals in the  $F_2$  from the reciprocal crosses of Kanari and Ambalema were selected for mosaic resistance and promising plants that were to some extent satisfactory in quality and leaf shape were used for back-crossing with Kanari. In the  $F_1$  from this back-cross the types like Kanari have provided seed which has been bulked and is to be used for further selection.

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\* An extended summary of this paper is on file at the Bureau.

The X-ray mutant KR4 which is of very good quality, does not appear to breed true for rate of growth. Seed from early- and late-flowering plants has been collected and an attempt is to be made to combine the high quality of the leaf with the desired rate of growth.

Results of variety trials are reported.

Tests of X-ray mutants at Djombor and Methook showed that the Chlorina hybrids and KR4 were superior to the other mutants, though some of the KR strains, namely, Nos 5, 7, 9 and 10 are varieties of value for use in crosses with subsequent selection.

In phytopathological research the following findings are recorded:—

The Ambalema hybrids Nos I and II have shown resistance to mosaic diseases but whether this is a complete or merely an apparent resistance is being investigated.

No definite conclusions could be drawn from the tests of Timor-Vorstenland tobaccos for resistance to slime disease, though indications of some degree of resistance had been found, and observations in another test suggest that the Timor-Vorstenland lines are somewhat more resistant than Y<sub>10</sub>. But three other new lines (obtained from the Deli Experiment Station and America) are also undergoing resistance tests, with the Ambalema hybrid and Y<sub>10</sub>; and some promising results have been obtained.

The Timor-Vorstenland lines, though somewhat less resistant to *Phytophthora* than in the previous year, were more than satisfactory in this respect even in the most dangerous localities and were superior in quality. *Oidium* resistance was demonstrated in a Timor cross and an Ambalema cross. The latter hybrid, which is of good quality, and also appears more resistant to *Phytophthora* than the Kanari strains and Y<sub>10</sub>, is to be used in further breeding.

1136. LOEFF, C. 633.71:575(92.2)  
Tabakselectie in de Vorstenlanden. (**Tobacco breeding in the Vorstenlanden**).

Erfelijkheid in Praktijk, Leiden 1939 : 4 : p. 160.

The early work and the development of the Experiment Station for Vorstenland Tobacco in Java is outlined. For reviews of recent research of this institution *vide* "Plant Breeding Abstracts", Vol. IX, Absts 806, 1135 and 1137.

1137. \*MIDDELBURG, H. A. 633.71:575(92.2)  
Proefstation voor Vorstenlandsche Tabak. Jaarverslag 1937-1938.  
(**Experiment Station for Vorstenland Tobacco. Annual report 1937-1938**).

Meded. Proefst. Vorstenl. Tab. Klaten (Java) 1939 : No. 87 : Pp. 73.

The crosses made in order to combine Vorstenland quality with the *Phytophthora* resistance of the Timor variety differed greatly in performance at Djombor and Methook. The Timor-Methook varieties were specially bright but somewhat uneven, so that though they were on the average more resistant, the Timor-Djombor strains are provisionally still to be preferred for distribution to planters.

Resistance determinations made with young plants of the Timor varieties in wooden boxes have given as good results as those obtained from field infection. Though a slightly greater susceptibility was noted in the young plant, it could not be concluded that the immunity was of a markedly mechanical nature.

Breeding for resistance to mosaic and slime disease is still in the early stages. In the F<sub>3</sub> from the mosaic resistant Ambalema x KW 10 no selection for quality was made in the 1938 preliminary planting, but the resistant Kanari-like forms were crossed with Timor Dj. to improve the quality and introduce *Phytophthora* resistance. According to Nolla (Cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 914) mosaic resistance is conditioned by two genetic factors. Selection for resistance, which is recessive, will be begun in the F<sub>2</sub> and with continual back-crossing of resistant to Vorstenland plants, the desired combination of Vorstenland quality and disease resistance should ultimately be produced.

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\* An extended summary of this paper is on file at the Bureau.

Deli strains resistant to slime disease have been crossed *inter se* and with Timor Dj. and KW 10. The  $F_8$  of the Deli-Vorstenland strain D2K (twice crossed with Kanari) at Djombor, combined the Vorstenland quality with the colour and leaf shape of Deli tobacco and showed the highest percentage of dry leaf and the highest burning time among the Djombor lines, as well as 10 per cent more brown brands than the Timor V. Dj.

Hybridization with the object of intensifying desirable features has been applied to the Kanari and  $Y_{10}$  lines. KK 63 (which underwent no further selection in 1937) exemplifies the production of a large leaved Kanari variety from a cross of two small leaved Kanari forms. Selection in existing varieties is practised to maintain or improve their quality. Among the Kanari X-ray mutants (KR) an early and a late variety, which differed little in quality from each other in 1937, have been isolated from the KR 4 mutant. Other mutants and their crosses with Chlorina ( $F_1$  generations) have proved inferior in quality to KW 10 and Chlorina x KW 10. One exception however, was the  $F_1$  from KW 10 x KR 5, a self-sterile mutant remarkable for its dryness and attractive quality. The many-leaved brown KR 9 and the KR 9 x KW 10  $F_1$  were notable for their relatively high burning period.

In variety trials during 1937 Timor V. Dj. proved outstanding as regards the external quality of the leaf and especially dryness and brightness. Its ash colour was not, however, good and selection for this feature is recommended.

Certain hybrid lines among the Ambalema crosses are 100 per cent resistant to mosaic but in habit and qualitative characters they still differ somewhat from the Vorstenland tobacco.

It is not yet clear how far the Ambalema crosses are resistant to other virus diseases.

Variety tests have shown that the Timor-Vorstenland variety is no more susceptible to mosaic, and probably even less so, than other varieties.

The progeny of various crosses were used in a comparative test of two methods of testing for resistance to slime disease, one based on infection in the field, and the other on infection in boxes. The results showed that the second method, which is simpler, is sufficiently reliable for use in the preliminary selection work where extreme accuracy is not required. Three strains R 749 x R 518, R 518 x R. v. Am. and R 749 x KW 10 retained their resistance in the  $F_2$  and are to undergo further crossing to improve the quality.

The Timor-Vorstenland variety showed practically no *Oidium* infection this year.

Preliminary experiments suggest that the resistance of the Timor-Vorstenland varieties to fungi is not correlated with a relatively larger number of leaf hairs, since the Kanari forms, which were more susceptible, had a somewhat higher number of hairs on the leaf.

The question of the simplification of the technique of field experimentation was examined.

Cigarette tests of aroma and flavour showed that KW 10 has less aroma than Chlorina and is improved by hybridization with the latter variety. KBS in general received favourable comment; the Timor-Vorstenland tobacco gave conflicting results.

Investigations were begun on the nature of the character, dryness, and the method of determining it.

1138. \*SCHWEIZER, J. 633.71:575(92.2)  
 Besoekisch Proefstation (Proefstation voor rubber, koffie en tabak).  
 Jaarverslag tabak over Juli 1937 t/m Juni 1938. [**Besoeki Experiment Station (Experiment Station for rubber, coffee and tobacco). Annual report on tobacco from July 1937 to June 1938**].  
 Meded. Besoek. Proefst. 1938 : No. 62 : Pp. 59.

In the selection trials Kedoe 103 was outstanding as regards the total amount of brown leaf. Kedoe 292 was inferior in colour but superior in length to the other varieties in the test. Both surpassed Kedoe 303 and Hybrid 343 in burning properties.

A number of new crosses were made between Kedoe strains and the Kedoe Hybrids 343 and 344.

In comparative trials of Deli hybrids, Hybrid No. 238 maintained its good reputation. Hybrid No. 362 did very well again this year and seems to be an improvement on Hybrid No. 344 which was below standard this year for the first time.

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\* An extended summary of this paper is on file at the Bureau.



Selection of wrapper types was continued at Djember with the  $F_3$  of crosses of Hybrid No. 344 and Deli lines, but results are not yet advanced enough for publication. A large number of  $F_1$  generations from crosses between newly imported Havanna lines with the best Deli and hybrid lines from Besoekei were planted out. The  $F_1$  hybrids from the following crosses seem particularly promising though the unfavourable weather made it impossible to get a good idea of their qualities as wrapper tobacco: Hybrid 238 x Kanari, Havanna 394 x Deli 340 and Hybrid 343 x Havanna 405.

X-ray irradiation of 7 Kedoe plants in pots was carried out at Malang and showed no abnormal effects in  $F_1$  but the  $F_2$  is still to be examined for induced mutations.

A number of forms were tested for resistance to *Phytophthora parasitica* var. *nicotiana*, but weather conditions made it impossible to obtain any reliable result. In the previous year's test no significant differences were found between Hybrids 238 and 343 in regard to *Phytophthora* resistance.

As regards resistance to *Phthorimaca heliopa*, significant differences were found between Connecticut Shade Tobacco x Hybrid 343 and all other varieties tested except the cross Connecticut Shade Tobacco x Hybrid 238. The cause of this difference has not been determined.

Differences found in the chemical composition of the leaves and stems of Hybrids Nos 238 and 344 have thrown light on the tendency of Hybrid 344 to produce "wet" tobacco as compared with Hybrid 238 which, under the same conditions, does not do so.

Selection work is now being continued with Virginia tobacco varieties from seed raised by the station and from imported seed.

1139. MIKHAILOVA, P. V.

633.71:575.113.4.061.6:581.331.2

**Inheritance of yellow leaf colour in *Nicotiana Tabacum* L.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 20 : 719-22.

Seeds of the back-cross families involving the varieties Khodossevich and Samsun were allowed to germinate and then kept at a temperature of 32° C. in the light. On the third day at this temperature, the "yellow" seedlings had already lost their original green colour, and the material was scored on the sixth day. The combination  $F_1$  ♀ x Khodossevich ♂ gave a normal 3 : 1 ratio of green to yellow, indicating that the yellow type is determined by duplicate recessive genes. The reciprocal cross showed a significant excess of green plants, a condition also observed by other workers. It is shown that this excess is in all probability due to a difference in the rate of pollen tube growth between pollen carrying the green and yellow factors.

1140. EGIZ, S. A.

633.71:575.127.2

**[Interspecific hybridization in the breeding of tobacco and makhorka (Theses)].**

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : p. 771.

A historical survey of the subject is given. Interspecific hybridization in *Nicotiana Tabacum* and *N. rustica* is thought to be capable of solving the following problems: the production of disease resistant forms, increasing the content of certain compounds such as nicotine, citric acid, etc., improving the aroma and sweetness, adapting the plant to mechanical cultivation, improving the form and structure of the organs utilized industrially and producing higher yielding or earlier strains.

1141.

633.71:575.127.2:575.129

ŽUKOV, N. I.

633.71:581.192:575

**Inheritance of nicotine and anabesine in interspecific hybrids *Nicotiana rustica* L. x *N. glauca* Grah.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1939 : 22 : 116-18.

When *N. rustica*, which contains nicotine and no anabesine, is crossed with *N. glauca*, which contains anabesine alone, the hybrids contain only anabesine. Similar dominance of anabesine over nicotine formation was shown in various polyploid derivatives of the cross. In amphidiploid plants the anabesine content varied from 4.19 to 8.04 per cent, which is much higher



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and *Stenophylloides* in relation to the rainfall. Wide variation was observed in regard to type in *C. canephora*, where a great deal of hybridization seems to have taken place; the same applies to the group *Excelsoides*; *C. stenophylla* exists in three main biotypes. The types are described and illustrated.

A study was also made of the  $F_1$  progeny of a high-yielding form known as Assikasso 19. Yield figures for 109 bushes showed that 32 individuals (i.e. 29.4 per cent of the trees) produced as much as 67.3 per cent of the total yield. By continuing these observations over five consecutive harvests it was possible to select the best plants; only seven maintained their superiority in all five years and of these the best in regard to bean quality are being retained for reproduction.

Measurements were made of the fruits and beans in 78 descendants of Assikasso 19 and the results are presented: all were of the type characteristic for the variety Indénie but certain families had more elongated fruits than others. Observations were also made on the number of corolla lobes which was found to differ slightly in different families. Individuals with aberrations in corolla lobe number were generally different from the type also in other characters. Variation was observed also in the colour of the fruits, which varied from purple to yellow, the mother tree having been of the yellow type; the progeny contained 17 yellow, 38 vermilion and 23 purple.

As a result of all the above studies only one out of all the trees examined has been retained for further propagation, both by seed and grafting; its characteristics are described; its quality has been pronounced by the experts to be superior to Robusta or Liberia.

Brief descriptions are also given of a number of descendants of a wild coffee *C. abeokutae* Cramer var. *longicarpa* taken into cultivation.

1149. ALVARADO, J. A. 633.73(72.81)  
Es el arábigo el rey de los cafés finos y remunerativos para explotarse?  
(Is Arabica the king of fine coffees profitable to grow?)  
Rev. Agríc. Guatemala 1938 : 15 : 143-76 ; 1939 : 16 : 14-19.

Descriptions are given of the coffee varieties grown in Guatemala, with discussions of their origin and comparisons of their yield, quality of product, climatic requirements, disease resistance, etc. This includes Arabica, Bourbon, San Ramón and Maragogipe. Though Bourbon gives a greater number of cherries per tree, Arabica is found to yield a greater quantity of marketable and high-quality product and its cultivation is therefore recommended.

1150. TEIXEIRA MENDES, J. E. and KRUG, C. A. 633.73:575(81)  
O cafeeiro e sua cultura. Pesquisas e trabalhos experimentais em andamento no Instituto Agrônômico do Estado de S. Paulo, em Campinas. (Coffee and its cultivation. Investigations and experimental work in progress at the Instituto Agrônômico do Estado de S. Paulo at Campinas).  
Bol. Téc. Inst. Agron. Campinas 1938 : No. 54 : Pp. 37.

The progress of coffee research in S. Paulo is traced from the foundation of the Institute and includes reference to a hybrid between *C. arabica* var. *maragogipe* and *C. arabica* var. *bourbon* made as early as 1899. The investigations include studies of the systematics of the species *C. arabica*, a list being given of the established varieties present in the Institute's collection, with indications of their value in cultivation and illustrations of a number of the forms. Similar studies in other species of *Coffea* are in progress. Data are being accumulated on the anatomy, physiology, cytology and genetics of coffee. In addition to the familiar diploid ( $n = 22$ ) and tetraploid ( $n = 44$ ), forms have been obtained by hybridization having chromosome numbers of 33, 52 and 55. An average degree of cross-pollination of 50 per cent has been observed, both wind and insects providing the mechanism.

Studies on the inheritance of a number of characters are in progress, together with an investigation of various somatic mutations and an extensive series of interspecific crossings has been made. Breeding work consists of selection on the basis of progeny performance in various

zones; many of the hybrids already obtained are more productive than the progenies of the respective parents and those of Maragogipe are notably resistant to die-back. Attempts are being made to produce forms resistant to *Stephanoderes Hampei* by selecting resistant hybrids, and if this fails, by selecting hybrids with the briefest possible period of flowering.

1151. MENDES, A. J. T. 633.73:576.312.34  
Morfologia dos cromosômos de *Coffea excelsa*. (**Morphology of the chromosomes of *C. excelsa***).

Bol. Téc. Inst. Agron. Campinas 1938 : No. 56 : Pp. 10.

Measurements of the 11 chromosomes of *C. excelsa* enabled the author to classify them into three groups. The position of the centromere, secondary constriction and any other morphological characteristics are described for each pair and the various types are illustrated.

1152. MENDES, A. J. T. 633.73:576.312.35  
Os cromosômos das Rubiaceas. (**The chromosomes of the Rubiaceae**).

Bol. Téc. Inst. Agron. Campinas 1938 : No. 55 : Pp. 11.

The karyological data on the Rubiaceae are reviewed from the literature and the results, including certain unpublished data of Krug and the author, are assembled in a table. In 90 per cent of the cases the basic number is  $x = 11$ . The Brazilian forms of *Coffea arabica* mostly have  $2n = 44$ , as opposed to the Javanese form examined by Homeyer and reported as diploid; the converse was observed in *C. liberica*, which was diploid in Brazil and tetraploid in Java: the suggestion is advanced that Homeyer's so-called *C. arabica* was in reality *C. excelsa*, though reasons are also presented for supposing that diploid forms of *C. arabica* do exist.

1153. 633.73:576.356.5:581.04

633.51:576.356.5:581.04

633.71:576.356.5:581.04

MENDES, A. J. T.

Duplicação do número de cromosômos em café, algodão e fumo, pela ação da colchicina. (**Duplication of the chromosome number in coffee, cotton and tobacco by the action of colchicine**).

Bol. Téc. Sec. Agric., Indústria. Com. S. Paulo 1939 : No. 57 : Pp. 21.

A review of the work of other authors on the action of colchicine is given.

The present experiments consisted of germinating seeds of *Coffea arabica* ( $2n = 44$ ) in solutions of colchicine of concentrations varying from 0.075 to 0.3 per cent. In the latter concentration, after an immersion of 4 days' duration, various abnormal plants were produced and all proved to have  $2n = 88$ . Root development, which tends to be inhibited by relatively high concentrations of colchicine, was stimulated by the addition of a solution of indole butyric acid, which greatly adds to the practical value of the method.

Similar treatment of cotton seeds resulted in the production of a number of abnormal plants of *Gossypium hirsutum* ( $2n = 52$ ) with  $2n = 104$  and of *G. herbaceum* ( $2n = 26$ ) with  $2n = 52$ . The concentration and time of immersion required were slightly less for cotton than for coffee. Plants and seeds of *Nicotiana Tabacum*, *N. glutinosa* and their hybrid were also treated and various anomalous plants were produced. These have not yet been examined cytologically.

1154. 633.73:582(69.1)

CHEVALIER, A.

633.73:581.192.6:575

Essai d'un groupement systématique des caféiers sauvages de Madagascar et des Iles Mascareignes. (**An attempt at a systematic grouping of the wild coffee trees of Madagascar and the Mascarenhas islands**).

Rev. Bot. Appl. 1938 : 18 : 825-43.

A number of wild coffee species grown in Madagascar are described. The majority are without caffeine and it is suggested that it might be possible to breed strains suitable for the production of coffee.

1155. HOED, F. and 633.79:575(49.3)  
 ELSOCHT, P. 633.79.00.14(49.3)  
 Contribution à l'étude de l'amélioration du houblon en Belgique.  
 (Contribution to the study of the improvement of hops in Belgium).  
 Ann. Gembl. 1939 : 45 : 65-119.

The origin, qualities and performances of a number of varieties and hybrids are given in tabulated form. The effects of manures of different kinds in varying proportions are described in detail. Further investigations on diseases, hybridization, etc., are to follow.

### AROMATIC PLANTS 633.8

1156. COCHRAN, H. L. 633.842:575.1.061.633  
 A chlorophyll deficient pimiento.  
 J. Hered. 1939 : 30 : 81-83.

A plant with a chlorophyll deficient branch was observed in a population of pimiento. Owing to early abscission of the fruits, no viable seed could be obtained to study the mode of inheritance of the character.

### OIL PLANTS 633.85

1157. 633.854.56(92)  
 633.854.56:575.42(92)  
*Aleurites montana* (Lour) Wils. en de daaruit gewonnen hout- of tung-olie.  
 [A. *montana* (Lour) Wils. and the wood-oil or tung oil].  
 Landbouw 1939 : 15 : 3-94.

This collection of articles on *Aleurites* begins with a preface by C. N. A. de Voogd dealing with the uses and quality of various oils and a brief survey of the introduction and development of tung tree cultivation in the Dutch East Indies and other countries.

Bibliographies accompany nearly all the articles, which are briefly analysed below:—

"The botanical study of *Aleurites*" by F. Wit (pp. 9-27) deals with the systematic classification and geographical distribution of *Aleurites* species; morphology, flowering, pollination and fruit setting; and on the importance of botanical studies in selection and in problems of cultivation.

Cultural methods are treated by W. K. Huitema and F. P. Ferwerda (pp. 28-42) pests and diseases of *A. montana* are reviewed by C. J. H. Franssen (pp. 47-53) and H. R. A. Muller (pp. 54-68) respectively.

In the contribution entitled "Indications for the selection of *Aleurites*" by H. J. Toxopeus, F. P. Ferwerda and W. K. Huitema (pp. 43-46) the following points are of interest:—

Since the importation of a large quantity of seed of *A. montana* and *A. Fordii* into the Dutch East Indies in 1930-33 efforts have been made to produce a suitable type of *Aleurites* as a source of oil. Pollination and the marked tendency to variation in the parent material available for breeding are questions to be considered in any attempt to produce the ideal tree which shall give the maximum yield of best quality oil per unit of area planted. Great variations have been found among trees in the amount of seed produced annually, the weight of the seed and its fat content and the elaeostearin content of the oil, which mainly determines the quality. The possibility that large seeds might be a desirable character to breed for is suggested, since the actual number of fruits produced (which is affected by the climate) would then be of less importance. Large fruits would also give relatively more oil since the proportion of husk to oil would be less. In the practice of selection it should also be remembered that vigorous growth is not always accompanied by productivity and that trees with a less spreading habit allow of a higher number of trees per hectare.

The existing imported material and the collection of superior mother trees and wild forms brought by Dr. Toxopeus from Indo-China should provide opportunities for selection and hybridization. The importance of testing seedlings and also buddings of any mother trees chosen is stressed.

A further discussion on selection is included in E. D. G. Frahm and D. R. Koolhaas' article (pp. 69-87) on the "Composition and examination of the *Aleurites* oils." In addition to the



chemical composition, seed weight and variation in the oil content of the seed are discussed, with data on the relative productivity of certain seedlings and mother trees. Some practical directions are given for estimating the value of trees undergoing selection. Aspects of production concerned with manufacture and trade are dealt with by Tan Sin Houw (pp. 88-90) and E. van Konijnenburg (pp. 91-94) respectively.

1158. TEIXEIRA MENDES, J. E. 633.854.56:575.42(81)  
Contribuição ao estudo da cultura do tungue (*Aleurites fordii*, Hemsley) no estado de São Paulo. [**Contribution to the study of the cultivation of tung (*A. Fordii*, Hemsley) in the state of São Paulo**].  
Bol. Inst. Agron. Campinas 1938 : No. 18 : Pp. 18.

The possibilities of tung cultivation in São Paulo are discussed; the forms already growing are exceedingly mixed and the conclusion is reached that selection of the most suitable is necessary before any real progress can be made. Selections are being made on the basis of yield, oil content of seeds, percentage germination, height of plant and coefficient of variation. The oil content varied between 46.49 and 60.20 per cent.

1159. LAPIN, W. K. 633.854.56:576.312.35  
(**Caryological studies of some *Aleurites* species**).  
Wks All-Union Sci. Res. Inst. Humid Subtropics, Sukhum 1937 : 1 : Ser. 4 : 69-74.

The number of chromosomes and their morphology is described for *A. Fordii* ( $2n = 22$ ), *A. cordata* ( $2n = 22$ ), *A. montana* ( $2n = 22$ ), *A. moluccana* ( $2n = 44$ ) from determinations made by the author. Literature on chromosome studies of the Euphorbiaceae is mentioned.

1160. AUBRÉVILLE, A. 633.855.34:575.42(66.68)  
Les deux stations expérimentales du palmier à huile. (**The two oil palm experiment stations**).  
Rev. Bot. Appl. 1939 : 19 : 1-14.

The work of oil palm breeding at the two French experiment stations of la Mé on the Ivory coast and of Pobé in Dahomey is reviewed. Work first started in 1924 at la Mé and in 1926 at Pobé and details are given of the methods of selection and of the results obtained.

#### MEDICINAL PLANTS 633.88

1161. MENDES, A. J. T. 633.885.1:576.312.35  
Estudo citológico da quineira (*Cinchona* spp.). (**Cytological study of *Cinchona* spp.**).  
J. Agron., S. Paulo 1939 : 2 : 43-48 : also Bol. Téc. Inst. Agron. Campinas 1939 : No. 58 : Pp. 8.

Microsporogenesis in *C. Calisaya* Wedd. was regular and revealed  $n = 17$ . Root counts were made in *C. Ledgeriana* Moens, showing  $2n = 34$ .

The majority of the Rubiaceae have  $n = 11$ , though in some of the genera closest to *Cinchona*  $n = 9$ . The number 17 in *Cinchona* is thought to be derived from an original 18 by the fusion of two of the chromosomes.

#### RUBBER PLANTS 633.91

1162. KOSTOFF, D. and TIBER, E. 633.913:576.356.5:581.04  
**A tetraploid rubber plant *Taraxacum Kok-saghyz* obtained by colchicine treatment.**  
C.R. (Doklady) Acad. Sci. U.R.S.S. 1939 : 22 : 119-20.

A tetraploid plant was obtained by treating seeds with colchicine. It set about 70 per cent of well developed seeds, which were much larger than in the diploid. It is hoped that the induction of polyploidy in this species may be a useful method of increasing the size of the roots.

1163. RUDENSKAJA, V. J. 633.913:581.43:575-181(47)  
**Anatomical premises for breeding large-rooted forms of kok-saghyz.**  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 20 : 617-20.

In general, it is shown that as root size increases in kok-saghyz the number of root latex vessels per unit area of cross-section decreases. The percentage of rubber yielded by the plant is closely correlated with the total area of latex vessel cross-section, the tendency therefore being for large roots to have a low rubber content.

It is shown, however, that the diameter of the individual vessel may vary considerably and that there is no definite relation between diameter of root and latex vessel size. It may therefore be possible to breed large-rooted strains of kok-saghyz which have a fairly high rubber content by selecting for large diameter of latex vessel.

## CAMPHOR PLANTS 633.95

1164. KRAVČENKO, JU. 633.956.0014(47)  
 633.956:575.12:581.192  
**(Variety trials of *Ocimum gratissimum*).**  
 Soviet Subtropics 1939 : Nos 2-3 : 82-84.

Previous work with hybrids of *O. gratissimum* crossed with *O. canum* is reviewed (Cf. "Plant Breeding Abstracts", Vol. IX, Abst. 399). The best of the  $F_1$  individuals contained 18-28 per cent of eugenol and 14-25 per cent of camphor. The  $F_2$  also had a high eugenol content, surpassing even the best of the  $F_1$  in this respect. Clones were obtained from the  $F_1$  and  $F_2$  for variety trials at various experiment stations and in 1937 some plants of a strain No. 2233 of the pure species *O. gratissimum* were also included in the tests. Several stations reported a reduction in the yield of essential oil in the  $F_2$  as compared with the  $F_1$ , but one  $F_2$  hybrid No. 54 equalled the  $F_1$  plants and gave a percentage yield of oil of 0.485 per cent; it also surpassed Nos 48 and 26 in its yield of oil per ha. which was 28 kg. The lowest corresponding figures were shown by the strain No. 2233.

The superiority of high grade hybrid clones as compared with the pure species as a source of raw material for essential oils and eugenol has been demonstrated by the trials.

## FRUIT TREES 634

1165. PAŠKEVIČ, V. V. 634:575(47)  
 634.11:001.4(47)  
**(An urgent problem in fruit culture).**  
 Sadovodstvo (Horticulture) 1939 : No. 1 : 36-37.

Fruit improvement by breeding necessitates comparison of new varieties with existing types and for identification purposes it is essential that full descriptions, adequately illustrated, of all standard and other Russian and foreign varieties should be available. The author has begun the collection of the necessary bibliographical data on the apples of the U.S.S.R. and already over 3,000 names have been compiled. A similar survey of apples of foreign origin in the U.S.S.R. should also be made. Moreover, the numerous new forms produced by breeders must not be omitted and the author hopes the journal Sadovodstvo (Horticulture) will assist by including descriptions and illustrations of varieties in its pages.

1166. SJUBAROVA, E. P. 634:575(47)  
 634-1.524.4(47)  
**(Fruit breeding in White Russia).**  
 Plodoovoščnoe Khozaistvo (Fruit and Vegetable Growing) 1938 : No. 12 : 33-35.

Michurin's work having demonstrated the value of local forms in fruit improvement, breeders in White Russia have made a collection of local and other forms of fruits and berries (about 3,000 specimens) including cultivated types from the Old and New World. This material is now to be used in the commercial development of any high yielding and ecologically well adapted varieties and in the production of new forms. Apples and pears are being tested

and are also included with plums and cherries in the breeding programme in which high quality, high yield and cold resistance are important aims. Some of the successful seedlings and hybrid apples, pears and plums produced are mentioned. Some promising cherries of the sweet cherry x sour cherry type have also been obtained and a cherry highly resistant to cold should, it is believed, be evolved from some forms resembling the Steppe cherry that have been bred from the wild cherry of the Ural region.

1167. HANSEN, N. E. 634:575(78.3)  
**Northern plant novelties for 1938.**  
 Dep. Hort., St. Coll. Brookings, S. Dak., February 5, 1938 : Pp. 10.  
 (Mimeographed).

ANONYMOUS.

- Northern plant novelties for 1939.**  
 Dep. Hort., St. Coll. Brookings, S. Dak., February 20, 1939 : Pp. 6.  
 (Mimeographed).

A large number of new hardy fruit varieties raised by the author are described. These include interspecific apple hybrids, a sweet dessert tomato, native American plum and cherry selections, pear hybrids, hardy apricots and grapes.

1168. STEPANOV, P. A. 634:575.12(47)  
**(Experimentalists—followers of Michurin).**  
 Plodoovoščnoe Khozaistvo (Fruit and Vegetable Growing) 1938 : No. 12 :  
 53–55.

An account of the stimulus given by Michurin's work to experimental fruit growing among amateurs and other growers in the U.S.S.R. The developments in many branches of the fruit industry are outlined with notes on improved varieties of apples, pears, small fruit and berries, vines, etc., and on the workers responsible for the various varieties and types that have been raised. Walnut production is also mentioned.

1169. ÖSTLIND, N. 634:576.356.5  
 Kromosomer. Diploida och triploida fruktsorter. **(Chromosomes.**  
**Diploid and triploid varieties of fruits).**  
 Fruktdlaren 1939 : No. 2 : 47–50.

A short and popular account of polyploidy in fruit trees.

1170. LIJFTOFT, G. 634:581.162:581.6  
 581.162:631.415  
 Over den invloed van het stuifmeel op de kwaliteit van het fruit. **(On**  
**the influence of the pollen on the quality of the fruit).**  
 Fruitteelt 1939 : 29 : 107–13.

Some further views of the author (Cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1305) on the unsolved problem of the mechanism underlying the influence of the pollen upon the fruit.

1171. PETROV, A. V. 634.11:575  
**(A new variety of apple—Arkad No. 1).**  
 Plodoovoščnoe Khozaistvo (Fruit and Vegetable Growing) 1938 : No. 12 :  
 35–36.

The new variety originated from the cross Borovinka x Arkad. Borovinka was chosen for its frost resistance and high yield, and Arkad, for its sweet and soft fruit. The hybrids came into bearing in 1933 and in 1937 they were selected for their abundant set of fruit, which ripens very early (from 26th July to 10th August). A harvest was also obtained in 1938 and the new variety appears to have inherited the desirable features of both its parents.



1172.

634.11:575(79.6)

**Test many new apple varieties.**

News Lett., Idaho 1939 : 22 : No. 2 : p. 1.

In connexion with the Idaho apple breeding programme, final test plots of 65 outstanding seedling selections have been established at Parma and at Moscow, Idaho. Further selection and propagation work is being continued and in 1937, twelve promising selections were made from 1,274 seedlings which fruited.

1173.

634.11:575.25

ČERNJAEV, I. P.

634:575.25

**(Take notice of sports).**

Sadovodstvo (Horticulture) 1939 : No. 1 : 37-41.

The importance of bud sports in apple cultivation is illustrated by reference to the work of Michurin and to many instances in American and Russian horticulture of the replacement of varieties by new forms derived from sports. Individual sports among Russian and other apple varieties are described with notes on their economic characteristics and similar information is briefly cited from various sources in regard to other fruits. Periclinal chimaeras and the frequency of bud mutation are also considered.

1174.

GARDNER, V. R.

634.11:575.255(77.4)

**Studies in the nature of the pomological variety. I. A hetero-chimeric apple sport and its vegetative progeny.**

Tech. Bull. Mich. Agric. Exp. Sta. 1938 : No. 161 : Pp. 14.

An aberrant apple tree, closely resembling the Northern Spy variety in vegetative characteristics, was found in a Michigan orchard. It bore fruits which were highly variable in shape, distribution of colour and time of ripening. The vegetative progeny of this tree (propagated as the "Graham" variety) also showed great variability, though no individual tree was as variable as the original one.

Evidence is presented which indicates that the original "Graham" tree was a chimaera. Comparisons made between it and certain standard fruit varieties suggest that they, too, may be chimaeras.

1175.

634.11:576.312.35:581.162.5(48.9)

WANSCHER, J. H.

634.13:576.312.35:581.162.5(48.9)

**Contributions to the cytology and life history of apple and pear.**

K. VetHøjsk. Aarsskr. 1939 : 21-70.

The chromosome numbers of some 78 varieties of apples and pears commercially grown in Denmark are recorded, and the pollen fertility of many of the forms is also discussed. It is concluded that the degree of pollen fertility of the varieties is so subject to fluctuation that it is virtually impossible to work out any genetic scheme to account for differences between varieties.

The cytology of the developing embryo-sac and endosperm in diploid and triploid apples is described in detail.

1176.

634.11:581.162.3:576.356.5

STOITCHKOFF, J. P.

634.13:581.162.3:576.356.5

**(Pollen viability and effectiveness of diploid apple and pear varieties).**

Annu. Univ. Sofia Fac. Agron. Sylvicult. 1937-1938 : 16 : 309-32.

633.13:575.252

Varieties with low pollen viability were found among diploid apples and pears, some being less viable than some triploid varieties. This low viability is independent of external conditions and cytological studies show that it is due to a degeneration affecting the pollen and sometimes the tapetum tissue of the anthers. Such diploid varieties are poor pollinators. A bud mutation of Winter Gold Pearmain showing decreased pollen viability is recorded. The author agrees with Heilborn that pollen fertility in diploid varieties is due to recessive factors.

1177. 634.11-2.111-1.521.6:575(47)  
634.23-2.111-1.521.6  
 RUDNITSKII, N. V.  
 (**Problems of northern fruit culture**).  
 Sadovodstvo (Horticulture) 1939 : No. 1 : 32-35.

Work is in progress at the Kirov Station to produce by hybridization varieties of apples and cherries with high yields and quality and combining frost resistance with early bearing and also early ripening to meet the requirements for cultivation in the northern regions of the U.S.S.R. The interaction between stock and scion and the significance of the branching habit, root type, etc., have been studied in relation to frost resistance. The investigation of available varieties including local forms, breeding work and the study of cultivation problems would be included in the programme of future experimentation.

### CITRUS FRUITS 634.3

1178. 634.3  
 L'HEUREUX, L.  
 Les agrumes. (**Citrus**).  
 Congo 1938 : Tome II : 59-66, 179-96, 257-95.

Some of the varieties of citrus cultivated in Europe are described and the greater part of the paper is devoted to cultural details for the growing of citrus.

1179. 634.3:575  
 RUGGIERI, G.  
 Le applicazioni della genetica in agrumicoltura. (**The application of genetics to citrus culture**).  
 Nuovi Ann. Minist. Agric. 1938 : 18 : 325-48.

A general review of the principles of genetics and the results of their application to citrus breeding.

The principal groups of hybrids, artificially obtained, are listed and some of the varieties which have arisen as mutations are described.

There is a bibliography of 91 papers.

1180. 634.3:575  
 VASCONCELLOS, J. de Carvalho e  
 Algumas considerações àcerca do melhoramento dos citrinos. (**Notes on citrus improvement**).  
 Agros 1938 : 21 : 131-36.

A brief outline is given of the modern citrus classification and of the objects and methods of breeding; emphasis is placed on the desirability of collecting all the existing Portuguese forms of orange, lemon and tangerine as a basis of selection. Reference is also made to the importance of bud selection and to the interspecific crosses made in the U.S.A.

1181. 634.3:575.12:578.088.1  
633.854.56:577.8:578.088.1  
 CLIMENCO, V. N.  
 (**Studies on the use of biochemical methods of selection in the breeding of citrus fruits and tung-oil tree**).  
 Bull. Batum Subtrop. Bot. Gdn 1936 : No. 1 : 123-26.

The water extract of powdered dry leaves was treated with 5 per cent KOH followed by a saturated solution of copper sulphate and Almens' reagent. Colorations were obtained which differed for different citrus species. The hybrids also gave colorations differing from those of the parent species, though usually resembling one species more than the other. The method is expected to be of great value in distinguishing hybrids from apomictic seedlings. The extract of tung leaves was treated with methylene blue, whereby a green coloration was obtained which differed in the male and female plants, the latter being much deeper.

1182. 634.3:576.356.5:581.163  
 LAPIN, W. K.  
 (**Investigations on polyploidy in citrus**).  
 Wks All-Union Sci. Res. Inst. Humid Subtropics, Sukhum 1937 : 1 : Ser. 4 : 3-68.

A report is here given on the methods of obtaining polyploids in *Citrus*, investigated in connexion with the breeding of frost-resistant forms.

The author used (1) the callus technique and (2) mass cytological analysis of apomictic and hybrid ( $F_1$ ) seedlings as well as hybrids arising under open pollination. The hybrid material involved 29 crosses. Citrus breeding and the importance of polyploidy as an adjunct are discussed, with citations of relevant literature including research on chromosome numbers in citrus.

The second method of investigation adopted by the author proved a much more fertile source of polyploids than regeneration after wounding.

Triploids and hypertriploids, tetraploids and hexaploid forms were obtained. The percentage of polyploids among the seedlings ranged from 0 to 11.63 and varied with the genus and the species and also according to whether the seedlings were hybrids, or had arisen by apomixis, or from open pollination. In *C. limonia* 100 per cent. of the apomictic seedlings were diploid whilst of the open pollinated seedlings 2.29 per cent. were polyploid and of the hybrids 4.07 were polyploid. In *Poncirus trifoliatus* and *C. deliciosa* polyploidy was markedly correlated with apomixis.

Pollen studies and the occurrence of triploids among the hybrid progeny of *C. limonia* and of Shiva mikan respectively indicate that the diploid set of chromosomes was derived from the female parent.

1183. TOPURIDZE, E. M. 634.3:581.162  
**(The stages of the development of flower, and the periods of  
 blossoming in citrus trees).**

Bull. Batum Subtrop. Bot. Gdn 1936 : No. 1 : 47-60.

Detailed observations on the floral biology of *Citrus* species are described and indications are given regarding the best time to carry out the various operations involved in hybridization. Data are given on the time of flowering of the different forms, to serve as a guide in making crosses, since some combinations of parents do not coincide in flowering period under normal conditions of growth.

1184. CLIMENKO, C. T. 634.3:581.162.3  
**(Period of the receptibility of stigma in oranges).**

Bull. Batum Subtrop. Bot. Gdn 1936 : No. 1 : 127-29.

In 1935, flowers of the Clementine were pollinated at daily intervals with pollen of *Poncirus trifoliatus* and Orange No. 31 and the results showed that the receptivity of the stigmas was retained over a period of six days, the most receptive time being from the day before the flower opened to the fourth day.

Similar experiments were made in the following year, pollinations of the orange, Old Vini, by Shiva Mikan also being included; the period of receptivity was 7-8 days or even more, this extension being ascribed to more humid atmospheric conditions. Again the first 3-4 days were the best.

1185. BRICHET, J. 634.3-1.541.11:575.42  
**La sélection des porte-greffes en agrumiculture. (The selection of  
 stocks in citrus culture).**

Rev. Hort. Algérie 1938 : 42 : 217-23.

Outlines of a scheme for the selection of desirable stocks of the bitter orange *C. aurantium bigaradia*.

1186. BRIEGER, F. G., 634.31:575(81)  
 LEME, Z., 634.31:581.47:519.24  
 LIMA, J. F. and 634.31:575.252  
 MOREIRA, S.  
**Estudo sobre o melhoramento da laranja Bahia. (Study on the  
 improvement of the Bahia orange).**

J. Agron. S. Paulo 1938 : 1 : 359-96.

Observations on the crop of a number of grafted oranges showed the progeny of one tree, No. 17/2, to bear consistently smaller and more numerous fruits than other trees. A statistical analysis was made of the size of the fruits from these trees and the results are here presented.



A negative correlation was established between size and number of fruits. Analysis of variance showed that the trees could be classed into three distinct types, the first corresponding to the normal Bahia orange, with a mean fruit diameter of 83 mm. the second being the type known as Bahianinha Piracicaba, with mean fruit diameter of 75.7 mm. and the third a new type with fruits less than 69 mm. and called Bahianinha Araras; types 1 and 3 were each represented only by about 5 per cent of the total. The origin of these three types within a clone from a single parent tree is not known, either bud mutation or influence of stock being possible explanations.

Attempts are being made to fix the many fruited Araras type, which is considered commercially the most profitable.

1187. ESINOVSKAJA, V. N. 634.322:575.252  
**(An early mutant of the Unshiu mandarin).**  
 Soviet Subtropics 1939 : No. 4 (56) : p. 89.

The mutant twig bore four normally developed fruits which were fully ripe on the 14th October, when the rest of the fruit on the same tree was still green. The external and internal characteristics of the mutant fruits, which are of good quality, are described. The leaves of the mutant were narrower than normal.

1188. RUGGIERI, G. 634.334:575.252  
 Mutazioni vegetative su piante di limone ed opportunità della selezione  
 gemmaria in agrumicoltura. **(Vegetative mutations on lemon trees  
 and the opportunities for bud selection in citrus culture).**  
 Boll. Staz. Pat. Veg. Roma 1938 : 18 : 331-41.

A description of a bud mutation in which the branches ramified in a manner resembling witches' broom. The importance of eliminating such mal-formations is emphasized.

#### NUTS 634.5

1189. MCKAY, J. W. and 634.531:575.183:575.127.2  
 CRANE, H. L. 634.531:581.48:575-181  
**Xenia in the chestnut.**  
 Science 1939 : 89 : 348-49.

A direct effect of the pollen on the size of the hybrid seed is reported in extensive crosses involving *Castanea crenata*, *C. mollissima* and *C. sativa*. The results for particular combinations of species and varieties are not consistent and it is suggested that the varieties within a species are probably heterozygous for genetic factors which affect seed size.

*C. dentata* often produces nuts with split shells and it is suggested that this may be due to over-development of the kernel, following pollination by unsuitable varieties. The selection of proper pollinators is therefore important, since it affects both the size and quality of the nuts.

1190. HACQUART, A. 634.58:575.42(67.5)  
 L'amélioration des semences d'arachide au Sénégal. **(The improvement  
 of groundnut seed in Senegal).**  
 Bull. Agric. Congo Belge 1939 : 30 : 106-25.

As the groundnut is a self-fertilized crop, there is little variation but natural selection in Senegal has produced three types with characteristic fruits. These are:—(1) Cayor with small pods, thin shell and small seeds; (2) Baol with larger pods, fairly thin shell and seeds larger than Cayor; (3) Saloum, the pods often three-seeded, larger and with thicker shell. These characteristics are directly related to soil and climate, the small-fruited types with thin shell growing on light soils with a dry climate, those with large fruits and thick shell in the fertile and humid regions and the intermediate types in the intermediate districts.

The distribution of the area of cultivation has led to the disappearance of the Saloum type and now Baol is the most grown.

It is found that plants introduced from other countries with different ecological conditions do not adapt themselves to the new conditions.

With these data available it has been possible to devise schemes for the selection of types suitable to various districts.

The criterion for selection finally adopted was the average weight of the plant and the number of pods on the same plant. The details of the technique are described.

## PALMACEOUS AND OTHER FRUITS 634.6

1191.

634.653(79.4)

634.653:575

### **Avocado variety check list.**

Yearb. Calif. Avocado Ass. 1938 : 13-27.

Some 450 avocado varieties which have at some time or other been under test or in commercial cultivation in California are listed. Brief descriptions are given of the more important ones, including their mode of origin.

1192.

TRAUB, H. P. and

ROBINSON, T. R.

634.653:575

### **Improvement of the avocado.**

Yearb. Calif. Avocado Ass. 1938 : 125-34.

This is a reprint of a part of the article on breeding sub-tropical fruits other than *Citrus* which appeared as Separate No. 1589 of the U.S. Yearbook of Agriculture, 1937 (Cf. "Plant Breeding Abstracts", Vol. VII, Pp. 417-18).

1193.

634.653:575(79.4)

### **Report of the variety committee.**

Yearb. Calif. Avocado Ass. 1938 : 28-36.

Efforts to improve the avocado varieties of California are being directed to three main objectives: the discovery of forms with (1) fruits resembling those of the variety Fuerte, but with better bearing habits; (2) smaller Guatemalan type fruits of high quality, greater frost resistance and with a longer picking season to supplement the Fuerte season and (3) better thin-skinned fruits for producers in cold areas.

The criteria used in evaluating a new variety are listed.

It is considered that the most promising way of improving Californian avocados is by testing promising local seedlings of chance hybrid origin. Controlled hybridization of the crop presents great difficulties. Introduction of new types from other regions is not very promising, as the best Californian varieties are of the "leather-skinned" type which is apparently due to hybridization between the thin-skinned and thick-skinned races. These two races only occur together in California and in the valley of Atlixco, Mexico.

The committee intends to start during the coming year the preparation of an inventory of seedling avocados in southern California.

The importance both to the grower and to the committee of making individual tree yield records is stressed. Growers are also urged to register promising seedlings so that they may be properly named and studied. It is pointed out that promising new seedlings need not be too strongly discriminated against if they have dark-skinned fruit.

Several distinct strains of the Fuerte variety are being closely observed.

The variety Puebla is seen to have marked cold resistance and it is suggested that growers should plant it in exposed situations or as wind-breaks.

A modified procedure for the distribution of budwood for testing varieties is described and descriptions are given of the most important varieties grown to-day and of various promising experimental varieties and unregistered seedlings.

## SMALL BUSH FRUITS 634.7

1194.

KUZMIN, A. J.

634.7:575.127

(Some results of interspecific hybridization in *Ribes*, *Rubus* and *Fragaria*).

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 681-92.

By pollinating the first formed flowers of a seedling of *Ribes nigrum* var. *pauciflorum* Jancz.

with a mixture of pollen of *Grossularia reclinata*, *G. succirubra* and other species a hybrid was obtained and in 1936 it flowered and one weakly  $F_3$  plant was produced from the seed.

The first flowers of a hybrid *Ribes nigrum* L. x *R. dikuscha* Fisch. pollinated by the gooseberry Zelenyi Butyločnyi (Green Bottle) produced 98 hybrid plants, five of which flowered in their second year but the fruits were all shed in the early stages; in the following year 64 more flowered, the number of flowers per tree varying from 1 to 941, the number per inflorescence from 1 to 5, which is intermediate between the two parents. The hybrids were pollinated with a mixture of pollen from a number of varieties of black currant and gooseberry and 22 normal berries, most of them containing normal seeds, were obtained. The berries were equal in size to black currants, some were slightly larger; in flavour they were reminiscent of both parents. The plants nearly all bore spines, 9 of them were immune to *Sphaerotheca mors-uvae*. One spineless seedling has also occurred.

Hybrids between the black and red currants have hitherto been thought impossible. However by using Michurin's red currant Kazyrgan, obtained by crossing species of the series *Rubra* with species of the series *Petraea* as an "intermediary" success was achieved: by pollinating it with black currant varieties (*R. nigrum*) and with *Grossularia* in the former case a fairly high set of seed was obtained, especially when a mixture of pollen of different varieties of black currant was used; the black currant and the hybrid *R. nigrum* x *R. dikuscha* were also pollinated by Kazyrgan, and again produced a good set of seed. Kazyrgan was finally crossed with a seedling of *R. odoratum* Wendl.; this latter cross was less successful. Thus by the use of the "intermediary", successful combinations have been made between all three subgenera, the following numbers of plants being obtained in the different combinations: *Ribes* x *Coreosma* 168 plants, *Coreosma* x *Ribes* 128, *Coreosma* x *Grossularia* 1332, *Grossularia* x *Coreosma* 3 and *Ribes* x *Grossularia* 1. In the black x red currant hybrids the black currant characters are mostly dominant, except the characteristic aroma of the vegetative organs.

Similar methods have been used successfully in *Rubus* crosses; thus the hexaploid Michurin's Texas (selected loganberry seedling) was crossed by the diploid *R. Idaeus* and produced a large number of hybrid seeds and several seedlings. The Texas raspberry ( $2n = 42$ ) pollinated by Marlborough ( $2n = 14$ ) gave one fertile plant with  $2n = 35$ , resulting from fertilization by an unreduced gamete of the latter parent. From crosses of the raspberry Usanka ( $2n = 14$ ) x Texas a hybrid with  $2n = 28$  was obtained and by pollinating the triploid raspberry Orekhovka (*R. Idaeus*,  $2n = 21$ ) by the hexaploid Izobil'naja (Prolific) (*R. ursinus*,  $2n = 42$ ) seven fertile hybrids of the raspberry type were formed from unreduced gametes of the triploid; one of them was exceedingly fertile and formed perfectly normal fruits and is considered definitely promising.

In *Fragaria*, crosses have been made between *F. grandiflora* and *F. collina*, giving, in addition to a number of matroclinous hybrids, various true hybrids, of which two had  $2n = 35$  and were of low fertility; one seedling has fruited for three years in succession. Twenty-four seedlings have been obtained from crosses of *F. elatior* x *F. vesca*, all intermediate in type; six have borne normal fruit; all are thought to be  $2n = 35$  plants arising from fertilization by unreduced gametes of *F. vesca*.

1195. 634.71:575.127:576.16

ROZANOVA, M. A.

634.71:575.129:576.356

(Hybridization within the genera *Rubus* and *Fragaria* as related to problems of form-genesis).

Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 667-79.

The literature on the subject is reviewed before passing on to a description of the author's own work. She crossed the European raspberry, *R. Idaeus* s.sp. *vulgatus* Arrhen. with the northern dewberry, *R. caesius*, various races of the latter being used. In the cross with the Turkestan races an amphidiploid ( $2n = 42$ ) was obtained in the  $F_2$  and in the cross with the Perm race a hemiolodiploid ( $2n = 28$ ). Both showed a striking resemblance to *R. maximus* Marsson in the series Sub-Idaei, though their fruits were larger; this was to be expected since the raspberry parent used was a large fruited variety, not the wild form. The 28 chromosome form was fairly constant, its only fertile gametes being those with  $n = 21$ ; thus in crossing with



*R. Idaeus* it gave only plants with 27 chromosomes and with *R. caesius* plants with 35 chromosomes. It is thought that these results explain the polymorphism of the series Sub-Idaei in nature. The method of crossing species with different genomes but which do not differ sufficiently widely as to be sterile is regarded as a promising line of breeding in the genus *Rubus*.

In *Fragaria* on the other hand the species are all so closely related that the main obstacle to be overcome is the sterility resulting from the presence of multivalents and univalents. Crosses should therefore be made between species differing as little as possible in chromosome number and species with homologous genomes should be avoided since their crossing tends to the formation of multivalents and sterility ensues.

1196. VAARAMA, A. 634.711:576.312.35:576.354.4  
**Cytological studies on some Finnish species and hybrids of the  
 genus *Rubus* L.**

Maataloust. Aikakausk. 1939 : 11 : 72-85.

The somatic chromosome numbers for five species and three hybrids of *Rubus* were as follows:—*R. caesius* L., 28; *R. Idaeus* v. *anomalus* Arrh. (= *R. obtusifolius* Willd.), 14; *R. saxatilis* L., 28; *R. arcticus* L., 14; *R. humulifolius* C.A. Mey., 28; *R. saxatilis* x *arcticus*, 21; *R. caesius* x *Idaeus*, 21 and *R. caesius* x *saxatilis*, 28. Meiosis was studied in the hybrids and the systematic relationship of the parents is discussed.

1197. RIETSEMA, I. 634.711:575.14:575.125  
 634.711-2.8-1.521.6  
**Oplossing van het mozaïekvraagstuk bij de frambozen. (A solution of  
 the mosaic problem in raspberries).**

Landbouwk. Tijdschr. Wageningen 1939 : 51 : 14-25.

In view of the practical impossibility of protecting plantations in the raspberry district in Holland from mosaic and the fact that young seedlings were observed to be free from the disease, the writer suggests that the provision of a supply of constant inbred seedlings for use as planting material offers a solution of the mosaic problem. The present lecture records some of the findings in genetic analyses begun in 1928 of varieties and strains of raspberries, including Pyne's Royal, Lloyd George, Haagsche Bruine and strain No. 112 obtained by inbreeding the Devon variety. Fruit colour and size were among the characters studied and special attention was given to inbreeding and its effects in the production of dwarf, chlorotic, sterile or other abnormal forms.

The author believes that by the crossing of carefully studied inbred lines degeneration effects may be avoided and an adequate supply of young plants maintained which will be free from mosaic.

1198. WILLIAMS, C. F. 634.711-2.112-1.521.6:575.127.2(75.6)  
**The Dixie red raspberry.**

Ext. Circ. N.C. Agric. Ext. Serv. 1938 : No. 227 : Pp. 7.

A description of the Dixie red raspberry already briefly referred to in "Plant Breeding Abstracts", Vol. IX, Abst. 854. It is a selection from a cross between the Asiatic species *Rubus biflorus* and the American variety Latham. It is a vigorous grower, drought resistant and high yielding, and is resistant to most, if not all, of the serious raspberry diseases.

1199. BENEDICT, H. G. 634.714:575.252:581.49(79.4)  
**The Boysenberry without thorns, an early ripener.**

Market Gr. J. 1939 : 64 : p. 154.

A thornless bud sport obtained from a boysenberry plant growing at El Monte, California, has been propagated as a new variety. Its fruit ripens three weeks earlier than the ordinary boysenberry, which it is said to resemble in all other respects except for the absence of thorns.

1200. ANDERSON, O. C. 634.72-2.452-1.521.6  
**A cytological study of resistance of Viking currant to infection by *Cronartium ribicola*.**  
 Phytopathology 1939 : 29 : 26-40.

It was shown that *Cronartium ribicola* was able to infect young, fully expanded leaves of the resistant red currant variety Viking but that the young hyphae died at an early stage. The infected leaves showed minute necrotic flecks where the rust fungus had entered and died. It would appear that the resistance of Viking is due to some biochemical peculiarity and not to any anatomical difference from susceptible varieties.

1201. DARROW, G. M. 634.75:575(75.2)  
**The Northstar strawberry.**  
 Circ. U.S. Dep. Agric. 1938 : No. 517 : Pp. 2.

The Northstar strawberry, bred from the cross Howard 17 x Redheart, is being introduced for trial in the region extending from Virginia to Oklahoma and northward. It has done well in preliminary tests and is a second-early variety with firm fruit of large size and high quality, somewhat more tart than the variety Dorsett. The flowers produce an abundance of pollen.

1202. DARROW, G. M. and MORROW, E. B. 634.75:575(75.6)  
**Breeding new strawberry varieties.**  
 Bull. N.C. Agric. Exp. Sta. 1939 : No. 320 : Pp. 12.

Descriptions are given of three new strawberry varieties, Fairmore, Daybreak and Eleanor Roosevelt, which were derived from crosses of Blakemore x Fairfax, Missionary x Fairfax and Bellmar x Fairfax respectively. The first two are recommended for trial plantings in eastern North Carolina and the latter for trial over a wider area extending from North Carolina northwards to Maryland and westwards to Oklahoma and Kansas.

1203. PETROV, D. F. and PHILOSOPHOVA, T. P. 634.75:575.127.2:581.162.5  
**(Production with the aid of Mitchurin's method of the auxiliary species of 3 species hybrids comprising the genomes of 3 different chromosome species of *Fragaria*).**  
 Biologičeskii Žurnal (Biologicheskij Zhurnal) 1938 : 7 : 527-36.

From the pollination of fifty florets of a pistillate plant of *F. elatior* by *F. neglecta* one plant was obtained, the leaves of which resembled those of *F. neglecta* in shape. Though the form of the inflorescence, and the comparative measurements of the calyx and petals were of the intermediate type, in its general vigorous development, erect type of pubescence on the pedicels and the possession of unisexual flowers the hybrid, which had  $2n = 28$  chromosomes, resembled *F. elatior*. Meiosis in this plant was in general regular; and the percentage of abortive pollen was 44 per cent in 1936 and 46 per cent in 1937.

From the pollination of 17 florets of a female plant of *F. orientalis* by *F. elatior* x *F. neglecta* 148 seedlings were raised, but they had not yet flowered in 1937. Morphologically they resembled *F. orientalis* and only in certain features pertaining to the leaves, pubescence and in a few other characteristics was there any marked segregation. The somatic chromosome number in 15 plants was 28, and in two plants, 42.

Ten flowers of a pistillate plant of *F. elatior* were pollinated by a mixture of pollen from *F. vesca* and *F. neglecta* and 73 plants were obtained in 16 of which the somatic chromosome number was 42, while 8 others had 35 chromosomes and 25 others had 28 chromosomes.

The 42 chromosome plants were typical representatives of *F. elatior* in their main characteristics and probably arose as a result of apogamy or of chance pollination by *F. elatior*. Out of 20 plants that flowered 10 proved entirely pistillate and 10 entirely staminate. The percentage of aborted pollen for the group varied from 0-9.5.

The 35 chromosome plants were typical hybrids; six were intermediate between *F. elatior* and *F. vesca*, the latter having apparently been the pollinator, while two other plants had apparently arisen from pollination by *F. neglecta*. Of the former group four were staminate and two pistillate. The percentage of aborted pollen was 60 in two plants and 63 in one plant. The reduction division, studied in these three individuals, showed irregularities affecting chromosome pairing and chromosome distribution at metaphase and lagging chromosomes were seen at anaphase. The pistillate plants of this group set normally developed fruits but with only about 50 per cent of normally developed seeds.

The two 35-chromosome plants whose pollen parent was *F. neglecta* were staminate. One had 35 per cent and the other 60 per cent of aborted pollen.

All the 28-chromosome plants were externally typical hybrids and of two kinds, five evidently having arisen from pollination by *F. vesca* and twenty from pollination by *F. neglecta*. The five, which were indistinguishable from the 35-chromosome plants from the same pollen parent, comprised three with pistillate flowers and two with staminate flowers. The percentage of aborted pollen from a count based on one plant was 29.

The pistillate plants set normal fruits with mostly normally developed seeds. The 20 plants derived from *F. neglecta* also closely resembled the 35-chromosome plants from this pollen parent.

Of these plants 18 flowered, 12 being pistillate and 6 staminate. The percentage of aborted pollen was 16, calculated from one plant. The pistillate plants set normally developed fruits which had mostly normal seeds.

The writer claims to have obtained by Michurin's auxiliary species method chromosomally balanced forms containing the three different genomes of three species and likely to prove fertile to some extent.

The results are discussed in the light of other workers' results as well as from the cytological standpoint and with special reference to chromosome conjugation.

The results confirm the view that in *F. elatior* the female sex type is heterozygous and that the presence of two genomes from the hermaphrodite, 7 chromosome species *F. neglecta* or *F. vesca* does not inhibit the normal manifestation of both the female and the male factor from *F. elatior* in 35-chromosome hybrids.

1204. KEMMER, E. and

HEROLD, G.

634.75.00.14(43)

Zur Sortenfrage bei Erdbeeren. (**The variety question in strawberries**).

Forschungsdienst 1939 : 7 : 353-60.

The authenticity and varietal purity of strawberry varieties is very unsatisfactory. An examination of 29 varieties of strawberries showed that only 7 were true to name. Some varieties with very abundant runners had a low yield but no definite correlation could be established. The number of inflorescences is not a criterion of yield. Certain varieties are entirely female and need pollinators.

A three years' yield test showed considerable fluctuations within the varieties.

#### OTHER FRUITS 634.77

1205. ITIE, G.

634.771:575

El mejoramiento del platano. (**Banana improvement**).

Agricultura, Mexico 1938 : 1 : No. 7 : 3-7.

A review of the work of Cheesman in Trinidad.

1206. GRANER, E. A.

634.771:581.162.5:576.356

Irregularidades na meiose de uma forma diploide esteril de bananeira.

(**Meiotic irregularities of a sterile diploid form of banana**).

J. Agron., S. Paulo 1939 : 2 : 1-8.

The form known as Banana Ouro, though diploid with  $2n = 22$ , is nevertheless sterile. An examination of meiosis showed pairing to be regular at metaphase but separation at anaphase was invariably irregular and one or more chromosomes not infrequently failed to reach the daughter cells. Fifty per cent. of the pollen was empty and the fruits were entirely seedless. It is not known whether the sterility is due to hybridity or to physiological causes.



## VITICULTURE 634.8

1207. MOOG, H. 634.835:001.4  
 Warum ist eine amtliche Sortenbezeichnung im Weinbau notwendig?  
 (Why is an official specification of varieties necessary in viticulture?)  
 Weinland 1939 : 11 : 89-93.

The confusion in the naming of varieties of vines is abundantly illustrated and the need for official measures is stressed.

1208. 634.835:575  
 La génétique en viticulture. (**Genetics in viticulture**).  
 Rapp. V<sup>ème</sup> Congr. Int. Vigne et Vin, Lisbonne 1938 : Tome I (Viticulture) :  
 173-215.  
 Kondareff, M. *Le point de vue Bulgare. (The Bulgarian point of view). (pp. 173-74).*

In this brief report on the position of genetics in Bulgarian viticulture, it is shown that although hybridization and selection are being carried out the results have not yet been distributed to the growers.

- Branas, Bernon, G. and Levadoux, L. Le point de vue Français. (The French point of view). (pp. 174-205).*

The historical aspect of the genetics of the vine is reviewed. The influence of the variety *Tekturier mâle*, with pigment in the pulp as well as the skin, on the progeny of various crosses in which it is concerned as a parent is discussed and illustrated. With regard to fertility the hypothesis is put forward that the heterozygous plants (*Ff*) are male, the hermaphrodite factor (*f*) being recessive. The possibilities of improvement of dessert grapes, grapes for wine, for use as stocks and as direct producers are discussed.

- Pantanelli, E. Le point de vue Italien. (The Italian point of view). (pp. 205-15). Also Rev. Vitic., Paris 1938 : 89 : 478-85.*

A short account of the development of vine breeding in Italy and the aims of present research.

1209. HUSFELD, B. 634.835:575  
 La génétique en viticulture. (**Genetics in viticulture**).  
 Rapp. V<sup>ème</sup> Congr. Int. Vigne et Vin, Lisbonne 1938 : Tome I (Viticulture) :  
 147-72.

A general report, which follows the lines, though in some respects slightly extended, of the paper reviewed in "Plant Breeding Abstracts", Vol. IX, Abst. 472.

1210. STUMMER, A. and 634.835:575.061.6  
 FRIMMEL, F. 634.835:575.125  
 Bericht über die Rebenzüchtungsarbeiten des Jahres 1937. (**Report on the work on vine breeding in the year 1937**).  
 Verlautb. dtsh. Sekt. mähr. Landeskulturrat. 1938 : 39/15 : No. 4 : 41-44.

Among the vines raised in 1936 and 1937 variegation was again found in the group of Rheinriesling rot x Veltliner rot and Rheinriesling rot x Gutedel rot and also in a Neuburg selfed form. A defective factorial basis for chlorophyll formation had already been observed in the above two crosses at a very early stage.

Greenhouse tests of *Peronospora* infection are being conducted with success. Genetically conditioned resistance to the fungus has been found in many European vines.

In the Veltliner grün a mutation of the "Blue Hans" type from Guldenfurth is recorded. Some years ago investigations by the authors led them to conclude that seeds from a cross of two genetically similar plants were larger than seed obtained from selfed plants, owing to physiological stimulation resulting from fertilization occurring in a foreign cytoplasm. The authors now reply to Negrul's criticism of this theory (Cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1337).

1211. NAVARRO, A. F. and VASCONCELLOS, J. de Carvalho e 634.835:575.12:582  
 Características ampelográficas e ampelotaxonómicas no género *Vitis*, L.  
 (Ampelographic and taxonomic characteristics in the genus *Vitis*, L.).  
 Vème Congr. Int. Vigne et Vin, Lisbonne 1938 : Pp. 25.  
 VASCONCELLOS, J. de Carvalho e  
 Clones de videira da região de Carcavelos. (Vine clones of the Carcavelos region).  
 Ibid. 1938 : Pp. 51.

The authors discuss the various morphological and other characters of most use in distinguishing the species of *Vitis* and their hybrids (Cf. "Plant Breeding Abstracts", Vol. III, Abst. 739). Characters of the young leaf, together with the internal structure of the shoots and leaves are considered taxonomically the best. Attention is called to the frequency of mosaics in respect of many vegetative characters in cultivated vines, which are nearly all heterozygous.

Detailed examinations have been made of a number of representatives of the main vine varieties cultivated in the Carcavelos region and in the second pamphlet these varieties are described. The descriptions are supplemented by tables of data and a key for identification.

1212. POZZI-ESCOT, E. 634.835:575.183  
 Un cas de xénie chez la vigne. (A case of xenia in the vine).  
 C.R. Acad. Sci. Paris 1939 : 208 : p. 1046.

The exceptional conditions of 1938 led to the simultaneous flowering of *Vitis vinifera* and of a number of hybrids of Couderc, Seibel and Baco. Later in the season the grapes of some plants of the variety Chasselas doré developed a marked foxy flavour, though this did not occur in every bunch or in every grape of a bunch. It was only observed on plants grafted on *Vitis rupestris*.

1213. KAWA, A. and VEH, O. v. 634.835:575.42:581.192:581.6  
 Ist die Gesamtsäure ein zuverlässiger Anhaltspunkt bei der Auslese in der Rebenzüchtung? (Is the total acidity a reliable guide for selection in vine breeding?)  
 Weinland 1939 : 11 : p. 72.

Experiments show that the total acidity does not give any reliable indication for the estimation of the flavour.

The pH value of the sap should be included with the tasting tests and values for total acidity in judging the flavour of seedlings.

1214. ZABALA, S. 634.835:581.162.31  
 Observaciones sobre la fecundación en la vid. (Observations on fertilization in the vine).  
 Rev. Argent. Agron. 1938 : 5 : 294-95.

A list is given of varieties shown by experiment to be self-fertile.

## FORESTRY 634.9

1215. KRIJTHE, N. 634.972.8:581.162.3:576.312.35  
 Verslag over de werkzaamheden voor het Iepenziekte-Comité, verricht aan het Laboratorium voor Erfelijkheidsleer in 1938. (Report on the activities of the Elm Disease Committee, carried out at the Genetics Laboratory in 1938).  
 Tijdschr. PlZiekt. 1939 : 45 : 63-70.

Continuing the 1937 report (Cf. "Plant Breeding Abstracts", Vol. IX, Abst. 492) the conditions as regards flowering and pollination in 1938 are described, with an outline of the crosses made during that year. A number of species used as female parents gave seedlings which must

either have arisen from accidental selfings occurring among the material used in crossing, or be due to dominance of the characters of the mother plant.

Data were collected on the germination of immature fruits of *Ulmus hollandica* and on the germination percentage and general results in obtaining hybrid seedlings in 1938.

Observations on the 1937 seedlings failed to confirm R. Melville's theory of a correlation between the type of leaf arrangement and hybridity in elms: possibly, however, the parent plants used had been too heterozygous to allow of the identification of the hybrid seedlings.

Cytological studies included observations on the rate of flower bud development and chromosome determinations. All eight species examined had 14 chromosomes, with the exception of *U. turkestanica* in which instances of chromosome doubling were found.

1216. KRIJTHE, N. and WENT, J. C. 634.972.8-2.42-1.521.6:575.12  
Inoculaties van iepenbastarden verricht in 1938. (**Inoculations of elm hybrids, carried out in 1938**).  
Tijdschr. PlZiekt. 1939 : 45 : 71-74.

Inoculation of the 1937 hybrids confirmed the high percentage of susceptibility to elm disease among seedlings derived from crosses in which *Ulmus laevis*, *U. glabra* or *U. glabra major* was the female parent.

An attempt was made to classify the hybrids according to their leaf shape and growth habit and some evidence was obtained which suggests that *U. hollandica superba* forms may have arisen from crosses containing *U. glabra*. *U. hollandica belgica*, on the other hand, produced no hybrids of the *U. glabra* type.

In general the year's results showed a clear relation between the type of the hybrids and their susceptibility.

1217. WENT, J. C. 634.972.8-2.42-1.521.6:575.12  
Verslag van de onderzoekingen over de iepenziekte, verricht op het Phytopathologisch Laboratorium "Willie Commelin Scholten" te Baarn, gedurende 1938. (**Report on the investigations on elm disease, carried out at the Willie Commelin Scholten Phytopathological Laboratory at Baarn, during 1938**).  
Tijdschr. PlZiekt. 1939 : 45 : 52-62.

A progress report (Cf. "Plant Breeding Abstracts", Vol. IX, Absts 493 and 494) concerned mainly with descriptions of the inoculations made and the reactions obtained with plant material which is grouped as seedlings of unknown parentage and seedlings of which one or other parent or both parents are known.

1218. FLEISCHMANN, R. 634.973:575.22  
Weitere Ergebnisse auf dem Gebiete der Robinienzüchtung. (**Further results in the field of Robinia breeding**).  
Züchter 1939 : 11 : 90-94.

Variations in germination capacity, in height, leaf development, flowering, thorniness, shape of fruit and root development, etc., are noted and offer opportunities for selection and further improvements.

1219. WAGENER, W. W. 634.975-2.483-1.521.6:575(79.4)  
**The canker of Cupressus induced by Coryneum cardinale N. Sp.**  
J. Agric. Res. 1939 : 58 : 1-46.

A description is given of the disease, which affects principally *Cupressus macrocarpa* and which has become important in California in recent years. In infected areas some trees survive, and it is suggested that a search should be made among them for resistant strains. There are certain disadvantages attached to vegetative reproduction in *Cupressus*, however, and the breeding of resistant hybrids may be a better mode of approach. Apparently no artificial crosses between cupressoids have as yet been made, so that an experimental technique would have to be worked out.

Indications of the relative susceptibility of various cupressoids as determined by inoculation tests are given.



1220. KRISTENSEN, R. 635:575(48.9)  
 Foraedling af køkkenurter. (**Breeding of vegetables**).  
 Tidsskr. Frøavl 1938 : 14 : 122-29.

A lecture on the aims and methods of plant breeding as applied to culinary vegetables with particular reference to the work of Danish institutions.

1221. FISCHER, A. 635:576.16  
 Über die Herkunft der Gemüsearten. (**On the origin of vegetables**).  
 Naturwissenschaften 1939 : 27 : 205-09.

An account of the geographical origin and distribution of the principal kinds of vegetables.

1222. SHCHIBRYA, N. A. 635.24:575.127.2:633.854.78  
 (**Interspecific hybridization in the genus *Helianthus* L.**).  
 Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1938 : 733-69.

The first interspecific *Helianthus* hybrids to be obtained in the U.S.S.R. were those produced at Maikop in 1933 between *H. macrophyllus* Willd. and *H. annuus*. In 1934 hybrids between a wild form of *H. tuberosus* var. *purpurellus* Cock. and *H. annuus* were obtained and in 1935 hybrids between Jerusalem artichoke and sunflower, *H. tuberosus* x *H. annuus*. The work was later greatly extended and in 1937 5,000 hybrid seeds were produced, various botanical forms of both species being included in the crosses.

In spite of their being cross-pollinated plants most forms of both species gave a fairly uniform progeny. The time of flowering was adjusted successfully by photoperiodic treatment; the two species are planted together in isolated spaces and allowed to flower freely; the artichoke is in this way pollinated, mainly by bees, with pollen from the sunflower and over 90 per cent of hybrid seeds were obtained. Crosses of *H. tuberosus* with other species (e.g. *H. macrophyllus*) and with its wild relative *H. tuberosus* var. *purpurellus* were, contrary to expectation, much less successful. This is apparently owing to the better quality of the pollen in the hexaploid species *H. annuus* than in the other species.

The first generation plants show great variation in stem colour, habit and all the morphological features in which the two species differ, forms representing one or other parent and all possible intermediates being found. The majority of the plants exceed the parents in vigour, though in all families certain weaklings appear. The  $F_1$  plants, almost without exception, bear tubers; they flower more abundantly than the artichoke and there occur certain fertile plants in proportions varying between 4 and 18.7 per cent; in the progeny of seedling 33-1518a, a variety distinguished by exceptional fertility, as many as 10 per cent fertile plants occurred. The seed production is in all hybrids however exceedingly low. The rust resistance characteristic of the artichoke was fully dominant in the  $F_1$ , every plant of which was entirely free from attack. All the hybrids examined contained 68 somatic chromosomes or approximately so, which is equal to the sum of the haploid numbers of the two species ( $51 + 17 = 68$ ).

The characters of the flowers and inflorescence are mainly intermediate in the hybrids, except that the number of inflorescences often exceeds that of both parents. The length of the vegetation period is also intermediate in most hybrids. The tubers do not exactly resemble those of the artichoke but have a larger number of eyes, are more irregular in form and are much larger, some of them weighing as much as 1 kg.; in over 50 per cent of the hybrids the tubers are in a compact cluster, in which respect they are therefore superior to the artichoke parent. A further advantage of the hybrid tubers is their capacity for immediate germination, in which they are quite ten days earlier than the artichoke. In view of the great variation occurring in tuber form it is thought probable that by selection plants with regular tubers will be produced and certain promising hybrids have already been obtained. The tuber yield varies widely too, a few hybrids even exceeding the yield of the artichoke parent. The sunflower parent is therefore thought to contain certain factors for tuber yield supplementary to those in the artichoke.

The hybrids seem to have a greater tendency to mutate than either of the parents, various somatic mutations having been observed on a number of the plants.

The practical value of the hybrids lies in their great vegetative vigour; in 1937 they gave up to 339 per cent of the yield of tops obtained from the highest yielding artichoke varieties, combined in some cases with a higher yield of tubers too; also in the greater ease of lifting resulting from the compact cluster, in their capacity for vegetative multiplication without loss of yield and their pronounced response to intensive conditions of cultivation. They are susceptible to *Sclerotinia* and the tubers are low in keeping capacity and these defects it is hoped to remedy by studying a great number of clones of the hybrids and selecting the best.

A further point of interest in the hybrids is their chemical composition; the tubers and tops are equal to the parents in characters such as dry matter, sugar, protein and cellulose content, and in many cases superior, especially in protein and carbohydrate content. Furthermore some of the hybrids have a greatly increased rubber content in the leaves, equal to 0.43 per cent of the dry weight in some. The content of rubber plus resins equals 3.8 per cent.

The hybrids are to be used in the north, where the rapid germination of the tubers is a point of great practical importance, for silage and fodder, in the south for tuber production, and for the manufacture of alcohol from both tubers and stems, whereby the rubber obtained from the leaves will be a valuable by-product.

By allowing the hybrids to open-pollinate only 27  $F_2$  plants were obtained, crosses between different  $F_1$  hybrids also produced very few seeds and back-crosses with artichoke hardly any. Back-crosses with sunflower were somewhat more successful, giving a 1.3 per cent set in 3 per cent of the inflorescences pollinated; all the  $F_2$  plants from open pollination are thought to be back-crosses of this type.

The  $F_2$  was still more varied in habit and in morphological characters, many entirely new types appearing; the heterosis had entirely disappeared and many of the plants indeed were dwarfs. Quite one half the plants were annuals and many of the other 50 per cent formed not tubers but a sort of tuft analogous to that found in some of the perennial species of *Helianthus*. The tuber yield on the tuber bearing plants was much lower than in the  $F_1$  plants and never exceeded 100-200 gm. per plant. The flowers and inflorescences showed a much greater resemblance to the sunflower types and some were distinctly ornamental. The fertility was no higher than in  $F_1$  and in fact often lower, especially as regards the number of seeds formed. The  $F_2$  plants mostly flowered earlier than the  $F_1$  plants, approaching more nearly the flowering time of the sunflower parent. The immunity to rust remains however undiminished. The chromosome number varied in the  $F_2$  plants from 40 to 52. Certain interesting plants have been observed, for instance an exceedingly tall annual plant of the sunflower type with a single stem and a single large inflorescence which produced 9 large seeds. The  $F_1$  plants were also used to pollinate other species; with *H. mollis* Lam. no seeds were obtained, *H. rigidus* Desf. gave quite good results, so up to a point did *H. tuberosus* var. *purpurellus* Cock.; *H. tuberosus* gave very poor results and *H. annuus* quite good.

Crosses have also been attempted between *H. annuus* and *H. rigidus*, *H. mollis* and other species, positive results being obtained only with *H. rigidus*, and these only when this species is used as maternal parent.

1223. BROEKEMA, C. 635.25.0014(49.2)

Vergelykende veldproeven met uienselecties, oogst 1938. (**Comparative field trials with onion strains, 1938 crop**).

Inst. Plantenveredeling, Wageningen 1939 : No. 39/4 : Pp. 6. (Mimeographed).

Detailed descriptions of the varieties (including some new strains) are given with data on their performance as regards yield, red colouring in the bulb and percentage of flower stalks.

1224. WHITAKER, T. W. and

635.52:575.127.2:581.162.5

JAGGER, I. C.

635.52:576.354.4:576.312.34

**Cytogenetic observations in *Lactuca*.**

J. Agric. Res. 1939 : 58 : 297-306.

A brief description of meiosis in the following species of *Lactuca* is given: *L. sativa*, *L. Scariola*, *L. chondrillaeflora*, *L. perennis* and *L. tatarica* ( $n = 9$ ); *L. cretica* and *L. Bourgaei* ( $n = 8$ ) and *L. graminifolia* and *L. canadensis* ( $n = 17$ ).

Reciprocal crosses between most of the above species were attempted, but only two were successful, *L. sativa* x *L. Scariola* and *L. canadensis* x *L. graminifolia*. The  $F_1$  and  $F_2$  individuals of these crosses were fertile and no cytological irregularities were found.

The karyotype of all the diploid species is described; *L. sativa* was found to show the greatest amount of morphological differentiation between chromosomes.

With the exceptions of *L. perennis* x *L. Bourgaei*, the species studied were self-fertile and had a high percentage of pollen fertility. *L. perennis* failed to set seed, although pollen fertility was high. *L. Bourgaei* showed a somewhat reduced pollen fertility (80–85 per cent), apparently conditioned by meiotic irregularities. The species was self-fertile.

1225.

WONG, C. Y.

635.61/3:581.163:577.17

633.842:581.163:577.17

**Induced parthenocarp of water-melon, cucumber and pepper.**

Science 1939 : 89 : 417–18.

Parthenocarpic fruits were obtained in the National Pickling variety of cucumber, in eleven varieties of water-melon and in Harris Wonder pepper, as well as in three plants of Winter Sweet water-melon which were raised from colchicine-treated seed and which were self-sterile, by treating the young flowers with naphthalene acetic acid in lanolin paste or in aqueous solution. In the case of the water-melon experiments, indolebutyric acid treatment was also tried, but was ineffective.

1226.

MININA, E. G.

635.61/3–1.811:581.192.2:577.841

**On the phenotypical modification of sexual characters in higher plants under the influence of the conditions of nutrition and other external factors.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 298–301.

The proportion of pistillate to staminate flowers on plants of *Cucumis sativus* and *C. melo* was increased by the application of nitrogen fertilizers and decreased by the addition of potassium. Sulphur deficiency and carbon monoxide treatment increased the proportion of pistillate flowers.

It is shown that in all cases an increase in the proportion of female flowers is correlated with an increase in the sugar percentage of the plants.

Similar effects of nitrogen and potassium fertilizers were reported in maize.

1227.

POOLE, C. F. and

GRIMBALL, P. C.

635.61:577.8:575.11

**Inheritance of new sex forms in *Cucumis melo* L.**

J. Hered. 1939 : 30 : 21–25.

A new type of *Cucumis melo* bearing only perfect flowers was obtained among plant introductions from China. In crosses with the monoecious type, the above hermaphrodite appeared to be a double recessive. The  $F_2$  segregation was 9 monoecious ( $AG$ ): 3 andromonoecious (having mostly staminate but some perfect flowers,  $aG$ ): 3 gynomonoecious (mostly pistillate but some perfect flowers,  $Ag$ ): 1 hermaphrodite ( $ag$ ).

Gynomonoecious, the second new type, was subject to a considerable amount of fluctuation and many plants of the class were scored as gynoeceous (all flowers pistillate) or trimonoecious (having a mixture of staminate, pistillate and perfect flowers).

It is pointed out that in this material the apparently primitive character, hermaphrodite, has the recessive and not the dominant genetic constitution, which is contrary to the general relationship suggested by Vavilov between primitive characters and dominance.

Hermaphrodite musk-melons may be valuable in the southern United States, as they start to bear fruit earlier in the course of development and also cease bearing earlier.

1228.

MAHONEY, C. H.

635.611:575(75.2)

635.611–2.484–1.521.6:575

**Cantaloupe breeding and strain improvement.**

Trans. Peninsula Hort. Soc. 1938 : 28 : No. 5 : 134–35.

Inbred lines of the more important cantaloupe varieties have been developed at the Maryland



Agricultural Experiment Station and are being used in the production of new hybrids. Some of the most promising new types at present being developed were obtained from back-crosses of Honey Rock x Hale's Best hybrids to both parents. The back-cross to Honey Rock combines the desirable characters of that variety with the thick flesh of Hale's Best. The flavour is intermediate between the two parent varieties. Further back-crossing of the hybrid to Honey Rock was of no apparent advantage.

From the back-crosses to Hale's Best (a variety bred for the Imperial Valley of California that does not produce high quality fruits in the eastern states) it is hoped to develop a large-fruited Hale's type suited to local conditions.

Attention is now being turned to the production of *Fusarium* wilt-resistant cantaloupes and an effort will be made to combine wilt resistance with the desired commercial qualities.

1229. MAHONEY, C. H. 635.611:575(77.4)

**Superb Golden. A new hybrid muskmelon.**

Quart. Bull. Mich. Agric. Exp. Sta. 1939 : 21 : 225-27.

The Superb Golden variety of musk-melon was derived from the cross Emerald Gem x Honey Dew by inbreeding and selecting the progeny for several generations. Indications are given of the types of segregation observed, though no detailed genetical analysis was made.

The new variety is of extremely vigorous growth and matures from two to four days later than Honey Rock. It combined the crisp, sweet flesh of the Honey Dew with the aromatic flavour of the musk-melon. It requires a short period of after-ripening following harvest.

The ribbed fruit distinguishes the variety (which has deep orange flesh) from the green-fleshed western Honey Dew, so that it will be easily recognizable in the markets.

1230. LEACH, J. G. and 635.611-2.484-1.521.6:575(77.6)

CURRENCE, T. M. 635.611:575:578.08

**Fusarium wilt of muskmelons in Minnesota.**

Tech. Bull. Minn. Agric. Exp. Sta. 1938 : No. 129 : Pp. 32.

The causal fungus, its effects and its optimum conditions for growth are described in detail. Control is being attempted by the breeding of resistant varieties, preliminary work on which has already been reported (Cf. "Plant Breeding Abstracts", Vol. VI, Abst. 294). By continued selection, with inbreeding wherever possible, four promising resistant selections have now been isolated. None of these, however, is yet ready for distribution.

Inbreeding by hand pollination proved difficult, only 3.6 per cent of pollinations being successful. Improved results were obtained by enclosing the plants to be selfed in cages and introducing honey bees. In this way a 13.7 per cent set of fruit was obtained.

1231. FILOV, A. I. 635.615:575(47)

**(The new water-melon variety "Im. XVII Parts'ezd").**

Ovošćevodstvo (Vegetable Growing) 1939 : No. 1 : 43-44.

The new variety was obtained by selection from No. 143. It bears large fruits weighing 6-12 kg., rounded, green and yellow striped, with very firm rind, red, firm, juicy and very sweet flesh and seeds of medium size; the fruits are late in maturity and are of excellent keeping quality; there are 2-3 per plant; in 1934 the fruits had a sugar content of 9.5 per cent, which consisted moreover mainly of sucrose and fructose, thus making this variety sweeter than others that contain mainly glucose. The variety suffers much less loss in transport than others and is not inferior in yield.

1232. 635.615:576.16

PANGALO, K. I. 635.615:576.312.35

**Living ancestors of cultivated water-melons.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 20 : 599-601.

The author considers that the species *Citrullus edulis*, *C. colocynthoides* and *C. Colocynthis*, which are closely similar in karyotype and all have  $2n = 22$ , should be grouped together as *Citrullus* consp. *africanus*. These species are very distinct from *C. fistulosus* which is entirely different morphologically and has  $2n = 24$ .

The wild forms of South Africa and Egypt show a mixture of the characters of the three species of the *africanus* group, together with certain characters not previously known in water-melons. It is considered that they are relics of the ancestral stock from which the three later species diverged.

Further samples of seed of wild African water-melons are being obtained for further studies.

1233. COOK, H. T. and  
NUGENT, T. J. 635.615-2.484-1.521.6:575

**Fusarium wilt resistant watermelons.**

52nd Trans. Peninsula Hort Soc. 1938 : 28 : No. 5 : 30-38.

COOK, H. T. and

NUGENT, T. J.

**The Hawkesbury watermelon, a promising wilt-resistant variety.**

Phytopathology 1939 : 29 : p. 5. (Abst.).

ANONYMOUS.

**Hawkesbury wilt-resistant water melon.**

Hawkesbury Agric. Coll. J. 1939 : 36 : p. 23.

The first two papers contain an account of the performance of the new wilt-resistant watermelon variety Hawkesbury in Virginia and the surrounding states. It shows high field resistance to the disease though it is not immune when tested in the seedling stage in the greenhouse. In quality and yield of fruit it appears to be quite satisfactory. The Leesburg and Wilt Resistant Klondike varieties are also briefly described.

In the third paper it is pointed out that the Hawkesbury variety was discovered by Mr. N. S. Shirlow of the Hawkesbury Agricultural College, New South Wales, as a dark-seeded variant in a field of Grey Monarch. "Dark Seeded Grey Monarch" and "Wilt Resistant Thurmond Grey" are earlier synonyms for the variety.

1234. JAKIMOVIČ, A. D. 635.63:575.125  
(**Heterosis in cucumbers**).  
Plodoovoščnoe Khozaistvo (Fruit and Vegetable Growing) 1938 : No. 12 : 17-19.

Crosses were made involving 12 combinations of the following varieties of cucumbers: Klinskii, Nos 1, 2, 3 and 4, (which were used as the ♀ parents) and Muromskii Parižskii Kornišon, [Cornichon de Paris], Podkopaevskii, Parnikovyiustoicivyi, [Hotbed resistant], Kulenkamp, Berlizovskii, Černobrivets, Galakhovskii, Sensatsija, Vorgebirge and Stepan Razin, which were used as ♂ parents. Klinskii No. 1, 2, 3 or 4 was used as a control in the four groups of crosses.

Most of the hybrids in all 12 combinations were earlier than their respective ♀ parents.

Nearly all combinations showed an increase in yield, which in some instances was 40 per cent higher than the control. The only combination, however, which showed an increase in the size of the fruit as compared with the parent forms was the cross Klinskii No. 3 x Galakhovskii. To obtain plants exhibiting heterosis artificial pollination is unnecessary where outdoor cultivation is used.

Investigations to determine the most successful combinations of parent varieties should be made with a view to commercial development.

1235. HOLMES, F. O. 635.64:575.127.2(74.9)  
635.64-2.8-1.521.6:575.127.2  
**The Chilean tomato, *Lycopersicon chilense*, as a possible source of disease resistance.**

Phytopathology 1939 : 29 : 215-16. (Abst.).

The F<sub>1</sub> hybrid *Lycopersicon esculentum* x *L. chilense* has recently been produced. The hybrid plants are very vigorous. Their leaf characters are described.

It is hoped that *L. chilense* may be of use as parental material for introducing resistance to the tobacco mosaic virus into *L. esculentum*.

1236. SHIMAMURA, T. 635.64:576.356.5:581.04  
 (Experiments of inducing tetraploid in tomatoes by means of  
 colchicine).  
 Jap. J. Genet. 1938 : 14 : 304-08.

A brief note on the successful induction of polyploidy in *Lycopersicon pimpinellifolium* and *L. esculentum*. Lanolin pastes proved more effective than immersion of the seeds in colchicine solutions. With *L. pimpinellifolium* highly fertile tetraploids were obtained, but in those obtained from *L. esculentum* fertility was very low. In the latter species aneuploids and mixoploids were also found.

1237. YOUNG, P. A. 635.64-2.484-1.521.6  
 635.64:575.243.061.6:581.46:537.531  
**Resistance of tomato varieties to *Fusarium lycopersici*.**  
 Phytopathology 1939 : 29 : p. 25. (Abst.).

Figures are presented to show the relative wilt resistance of a large number of commercial tomato varieties.

The progeny of an X-ray treated Marglobe plant segregated to give a 3 : 1 ratio for yellow v. white flowers, with the white-flowered type recessive.

1238. STRONG, M. C. 635.64-2.484-1.521.6:575(77.4)  
**A new *Fusarium*-wilt-resistant tomato.**  
 Quart. Bull. Mich. Agric. Exp. Sta. 1939 : 21 : 164-69.

A *Fusarium* wilt-resistant strain of the tomato variety John Baer has been developed at the Michigan State College. The method used was repeated selection of plants growing on soil inoculated with a mixture of 50 different isolates of *Fusarium lycopersici*, obtained from widely separated localities. The exact technique employed is described in detail.

The new strain very closely resembles the parent variety in characters other than wilt resistance. Under conditions of severe wilt infection it has shown from 7 to 19 per cent of affected plants. This limited amount of infection takes place much later in the season than in the parent stock, so that it is much less serious. Under conditions of heavy infection the new strain has given two and a half times the yield of its parent. It is being released through the medium of the seed trade.

1239. GUBA, E. F. 635.64-2.484-1.521.6:575.127.2(74.4)  
**A red forcing tomato resistant to *Cladosporium* leaf mold.**  
 Phytopathology 1939 : 29 : p. 9. (Abst.).

A red tomato for commercial greenhouse cultivation that combines resistance to *Cladosporium fulvum* with satisfactory yield and quality has been developed at Waltham, Massachusetts. The new variety, Bay State, was selected from hybrids between Waltham Forcing and resistant pure lines selected from *Lycopersicon pimpinellifolium* x *L. esculentum* crosses.

1240. MURATOVA, V. S. 635.651:581.9:576.16  
 635.651:575  
**Ecological and geographical classification and evolution of beans  
 (*Vicia Faba* L.)**  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 199-201.

The geographical range of *Vicia Faba* is indicated and the kinds of variation existing within the species briefly described. The author has divided it into 17 geographical races, of which the more important are described. It is suggested that cyclic crosses between these various races would yield new forms of agricultural importance and could also give much useful information on the way in which the species has evolved.

1241. DITMER, E. E. 635.652:575(47)  
**(Breeding *Phaseolus*).**  
 Seleksijsa i Semenovodstvo (Breeding and Seed Growing) 1938 : No. 11 :  
 31-33.

Some of the industrial and other uses of beans of the *Phaseolus* type are referred to. The



most desirable type to breed for should be immune to disease, early, drought resistant and of good quality. The author gives a classification of *Phaseolus* types on the basis of the form of the seed and various morphological and biological features and he also outlines the types suitable for various regions of the U.S.S.R.

Mass and individual selection and also intra- and inter-specific hybridization are the lines along which breeding should proceed.

1242. DOWN, E. E. and THAYER, J. W. (Jr). 635.652:575(77.4)  
**The Michelite bean.**

Spec. Bull. Mich. Agric. Exp. Sta. 1938 : No. 295 : Pp. 23.

A full description is given of the new navy bean (*Phaseolus vulgaris*) variety Michelite, which was developed from the cross Early Prolific x Robust. The new variety exceeds Robust in yield of marketable beans, and equals it in resistance to mosaic and in field resistance to bacterial blight and bacterial wilt. It ripens at roughly the same time as Robust. It inherits from the Early Prolific parent the superior quality and appearance of the beans of that variety. The methods used in breeding the new variety are described in detail.

1243. ANDRUS, C. F. 635.652-2.483-1.521.6:575.11  
**The factorial interpretation of anthracnose resistance in beans.**  
 Phytopathology 1939 : 29 : p. 1. (Abst.).

A study was made of resistance to two physiological races of bean anthracnose (*Colletotrichum lindemuthianum*) in the progeny of crosses between ten parent varieties. A system of ten genes in three allelomorphous series, involving both duplicate and complementary dominant genes for resistance, one dominant for susceptibility and various factor interactions, is postulated to explain the results obtained.

1244. SMITH, F. L. and HEWITT, W. B. 635.652-2.8-1.521.6(79.4)  
**Varietal susceptibility to common bean mosaic and transmission through seed.**

Bull. Calif. Agric. Exp. Sta. 1938 : No. 621 : Pp. 18.

Seedlings of 118 selections representing 51 varieties of *Phaseolus vulgaris* were artificially inoculated with common bean mosaic. They are classified into five arbitrary groups according to their susceptibility to the disease. A high degree of correlation was found between severity of the symptoms and the percentage of seeds transmitting mosaic.

1245. ANDERSSON, G. 635.655:575(48.5)  
 Sojabönan samt metoder och möjligheter för dess förädling i Sverige.  
**(Soya beans and methods and possibilities for their improvement in Sweden).**

Sverig. Utsädesfören. Tidskr. 1938 : 48 : 348-56.

The possibilities of growing soya beans in Sweden are discussed.

1246. PSAREV, G. M. 635.655:581.143.26.035.1:575.321  
**(The influence of characters derived from photoperiodic treatment on the behaviour of the progeny in soya bean).**

Sovetskaja Botanika (Soviet Botany) 1938 : Nos 4-5 : 111-20.

Seeds of Illini soya bean obtained from plants that had received different length of day treatments were sown. The plants grown under short day gave rise to progeny that flowered somewhat earlier than the average, and matured somewhat later; the plants were shorter, with a larger number of lateral shoots and shorter internodes. The yield was much greater in the progenies of the plants grown under long day.

The mechanism by which the effect is transmitted is not fully understood but the phenomenon is thought to be of practical value in breeding work in so far as it affects the rate of multiplication of new strains.

1247. PESOLA, V. A. 635.656:575(47.1)  
Kaleva-herne. (**Kaleva field pea**).

Valt. Maatalousk. Tiedon. 1938 : No. 147 : Pp. 12.

Kaleva field pea is a strain selected from a Finnish land pea in the year 1919 and was put on the market in 1937. Kaleva is a medium early, green-seeded, well-flavoured cooking pea, with fairly good yield. The northerly border of its growing area is considered to be about 63° N lat. (Cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1658). K. M.

1248. PESOLA, V. A. 635.656:575(47.1)  
Sinikka, uusi vihreä talousherne. (**Sinikka, a new green cooking pea**).

Valt. Maatalousk. Tiedon. 1939 : No. 158 : Pp. 15.

The parent varieties of Sinikka pea are the Svalöf cooking pea varieties Gyllen and Concordia. Sinikka is late, tall, vigorous and gives a rich yield. The seed is blue-green, round, rather large in size, well-flavoured and cooks fairly quickly. Sinikka is a profitable variety when grown together with oats, and is suitable for household use as well as for fodder purposes. K. M.

1249. ENIN, T. K. 635.656:575.12  
(**Results of some crosses of peas**).

Plodoovoščnoe Khozaistvo (Fruit and Vegetable Growing) 1938 : No. 12 : 20-22.

The variety of *Pisum sativum*, Alaska (an early form with inedible pods and of Canadian origin), was pollinated by Gigant (a late sugar variety of Italian origin). The cross gave a normal set and the type of the pollen parent was dominant in the F<sub>1</sub>. In the F<sub>2</sub> wide variation was observed in the various morphological and physiological characters studied, and even entirely new types hitherto unknown in *Pisum* occurred. Among the peculiarities noted were: bent, elongated and distorted stipules; irregular shape of the corolla and leaflets; anomalies of coloration of the flower, pods and stems. Dwarf forms, plants earlier or later in flowering and ripening than their parent forms and plants with numerous narrow and long pods also appeared.

In the third hybrid generation forms with sweet pods were obtained from F<sub>2</sub> hybrids with distorted and bent stipules.

Various characters and groups of characters bred true.

1250. ENIN, T. K. 635.656:575.12:575.125  
**Intravarietal crossing in peas.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1938 : 21 : 293-97.

Comparisons were made with respect to a number of quantitative characters between three varieties of peas, pure lines obtained from them (though the original varieties were themselves apparently pure or nearly so) and plants obtained by intravarietal crossing within the same varieties.

No positive effect was produced by intravarietal crossing with regard to the characters analysed. In one of the varieties such an effect was obtained in the F<sub>1</sub> with respect to the weight of seed per plant and number of plants per pod, but it was not confirmed in F<sub>2</sub>.

The author considers that intravarietal crossing might produce an effect if the parental forms were to be cultivated under different conditions for a long time prior to crossing.

1251. ATABEKOWA, A. I. 635.656:576.356:576.354.46:537.531  
(**Irregularities in microsporogenesis in plants arising from irradiated seed**).

Biologičeskij Žurnal (Biologischeskij Zhurnal) 1938 : 7 : 505-14.

A cytological examination of flower buds of *Pisum sativum* plants of the variety American Wonder, raised from seed irradiated with varying doses of X-rays revealed numerous anomalies in the development of the pollen mother cells and the pollen grains. Seed irradiated with 550 r gave rise to plants characterized by irregularities in the conjugation and subsequent distribution of the chromosomes to the pollen cells, the formation of monads, triads, tetrads,

pentads and of multi-nuclear cells, as well as the occurrence of supernumerary nuclei in the pollen grains, the last named aberration having been also found after a dosage of 750 r. Abortive pollen too was discovered in plants from seeds subjected to 550 or 750 r and with the latter dosage in two instances 95 per cent of non-viable pollen was recorded, though, on the other hand, one instance of completely sound pollen was also found.

The anomalies in meiosis were mostly observed after 550 r; with 750 r they were even more pronounced. With both these doses, however, normal microsporogenesis predominated and the yield was increased as compared with the control (Cf. "Plant Breeding Abstracts", Vol. VII, Abst. 1240).

1252.   MAYER, R. 635.658:575(44)  
Le problème de l'amélioration de la lentille verte. (**The problem of the  
improvement of the green lentil**).  
Sélectionneur 1938 : 7 : 96-104.

The literature on the botanical classification of the lentil is reviewed and brief descriptions are given of the species of the genus *Lens*.

The districts in France where the lentil is grown are noted and the biology of the green lentil is described. The improvements required are high yield, upright habit and resistance to *Bruchus pallidicornis* and *B. Lentis* and selection for these characters is in progress.

Resistance to *Bruchus* appears to be a heritable character.



## BOOK REVIEWS

HENDERSON, I. F. and

HENDERSON, W. D.

5:030.8

**A dictionary of scientific terms. Pronunciation, derivation, and definition of terms in biology, botany, zoology, anatomy, cytology, embryology, physiology.**

Oliver and Boyd, Edinburgh and London 1939 : 3rd ed. (revised by F. W. Kenneth). 16s. 0d. Pp. xii + 383.

The third edition of this admirable dictionary of scientific terms will be welcomed by all who have used the previous two editions.

The field covered is wide, including biology, botany, zoology, anatomy, cytology, embryology and physiology and the second edition published in 1929 contained definitions of about 11,500 terms. The new issue contains a small number of new terms, mainly words of recent appearance, and also some definitions of new meanings recently acquired by older terms.

The pronunciation and the etymological derivations from the Greek and Latin are indicated and a useful list of abbreviations is also included.

Speaking from many years' experience of its value, the reviewer can recommend this work with complete confidence as an invaluable reference book for libraries and educational institutions, for students of science and medicine and all others interested in the precise meaning of scientific terms.

NILSSON, E.

575:633

**Växtförädling med speciell hänsyn till trädgårdsväxterna. (Plant-breeding with special reference to garden plants).**

Nordisk Rotogravyr, Stockholm 1938 : Kr. 2.75. Pp. 151. illus.

In this small handbook, one of a series for gardeners, the practical aims of plant breeding, namely improvement in yield, quality, hardiness, disease resistance, etc. are first discussed, followed by a consideration of the choice of material which the plant breeder has at his disposal, self and cross-pollinated plants, hybridization of all sorts, wild species, polyploids, mutations, etc. The methods of selection and breeding are then discussed and the genetical principles underlying the methods are explained.

ROEMER, T. and

RUDORF, W.

575:633

**Handbuch der Pflanzenzüchtung. (Manual of plant-breeding).**

Paul Parey, Berlin 1939 : Vol. III. RM. 6.50.† Lief. 7 : Pp. 80 : 16 figs. 10 tables.

The seventh issue is the first part of Vol. III which is to include leguminous plants, grasses and *Brassica* forage plants. In it peas, *Pisum sativum* and *P. arvense*, and lupins are completed and the section on *Vicia* is begun.

SANSOME, F. W. and

PHILP, J.

575.1

**Recent advances in plant genetics.**

J. and A. Churchill, Ltd., London 1939 : 2nd ed. (revised and rewritten by F. W. Sansome). 18s. 0d. Pp. xii + 412 + 16. 55 figs. 49 tables.

This well-known book, which was first published in 1932, has now appeared in a second edition. This naturally contains much that is new, since the last seven years have seen considerable advances in many branches of genetics, but the size is not increased owing to the omission or curtailment of much of the older or less important material. The chapters on linkage, the constitution of the gene and interspecific hybridization have been extensively re-written and a new chapter on variegation and chimaeras has been added. A valuable innovation is a subject key to important literature, but otherwise the general arrangement of the book remains as before.

As a guide to genetical literature, geneticists and plant breeders will find the book very useful. It is unfortunate, however, that many errors have crept into the text, some of them carried over from the first edition.

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† 25 per cent reduction outside Germany.

SINNOTT, E. W. and

DUNN, L. C.

575.1

**Principles of genetics.**

McGraw-Hill Publishing Company, Ltd., London 1939: 3rd ed. 21s. 0d.

Pp. xiv + 408. 147 figs. 32 tables.

The third edition of this well-known text-book differs from the preceding edition (Cf. "Plant Breeding Abstracts", Vol. III, p. 153) in the incorporation of new material by revisions and additions, the general plan being much the same; as the authors say in their preface, "the heart of the book, however, continues to be general and well-established principles and the exemplification of these in problems for the student to solve."

Examples of the new material are the salivary gland chromosomes of *Drosophila*, the position effect, a new chapter on cytoplasmic inheritance and a brief account of biometrical analysis in the chapter on multiple factor inheritance. An interesting instance of fashion in genetical nomenclature is provided by the use of "allelomorph" in the third edition in place of "allele" in the second.

Perhaps the weakest part of the book is the purely cytological part and even here an advance over the second edition is evident, for the authors now mention the chiasmotypy theory as replacing the classical theory, though the two theories are not very clearly distinguished. In other parts of the book, where cytological and genetical evidence are more closely interwoven, the authors' grasp of the genetical material prevents their falling into serious error. The value of this useful text-book should be considerably enhanced by the competent way in which it has been brought up to date.

J. L. F.

WADDINGTON, C. H.

575.1:575:576.1

**An introduction to modern genetics.**

George Allen and Unwin, Ltd., London 1939: 18s. 0d. Pp. 441. 160 figs. 5 pls.

It is probably true that most text-books on genetics have been too rigidly confined to what the present author calls "formal genetics"—the discussion of Mendel's laws and the corresponding phenomena of chromosome behaviour, and genetic analysis in general. This book was of particular interest to the reviewer because the author has not taken this narrow view: there are, among others, very interesting sections on the action of the gene on development, on evolutionary mechanisms and the nature of the genetic differences between taxonomic entities, on human genetics and eugenics, and on the chemical nature of chromosome and gene. There is also a brief chapter on plant and animal breeding. All this does not mean that the more ordinary aspects of genetics have been neglected; they are in fact dealt with in a very interesting manner, with the facts well arranged and lucidly expressed.

The book contains an adequate index and a bibliography in which the policy has been to indicate review articles rather than original sources. It is singularly free from mistakes: among the few noted are the statements (on pp. 322-23) that the emmer wheats have 14 chromosomes as opposed to *Triticum durum* with 28 and that the tetraploid parent of Hope wheat was a *T. durum* variety, whereas it was, in fact, Yaroslav emmer.

One may regard the book as an outstandingly good survey of the present state of genetical science.

HARTMANN, M.

577.8

Geschlecht und Geschlechtsbestimmung im Tier- und Pflanzenreich.

(Sex and sex determination in the animal and plant kingdoms).

Sammlung Götschen Band 1127. Walter de Gruyter and Co., Berlin 1939:

RM. 1.62.† Pp. 110. 62 figs. 7 tables.

BUCHER, P.

576.6

Symbiose der Tiere mit pflanzlichen Mikroorganismen. (Symbiosis of animals with plant microorganisms).

Sammlung Götschen Band 1128. Walter de Gruyter and Co., Berlin 1939:

RM. 1.62.† Pp. 123. 121 figs.

Of these two booklets of the Götschen collection, volume 1127 gives a brief review of the phenomena of sex in plants and animals beginning with unicellular organisms and volume 1128

a brief survey of symbiosis. The booklets, written by experts, are abundantly illustrated and are each provided with an index and a glossary of technical terms. The present series on biological subjects when completed, is intended to form a uniform and systematic text book of biology.

MAXIMOV, N. A.

581.1

**Plant physiology.**

McGraw-Hill Publishing Company, Ltd., London 1938 : 2nd English ed.

Pp. xxii + 473. 144 figs.

This book is derived from the fifth Russian edition of Dr Maximov's book in the same way as the earlier English version was derived from the first and second Russian editions, by translation and editing. The translation is by Dr Irene V. Krassovsky and the editing by R. B. Harvey and A. E. Murneek. Since the fifth Russian edition was so radically revised, we are in effect presented with a new book and it is for this reason that the title has been changed from "Text-book of Plant Physiology" to "Plant Physiology".

The reasons for the thorough revision of the fifth Russian edition are clearly set forth in Maximov's preface to that edition, starting with the thesis that "the ultimate purpose of plant physiology is to control the growth and development of the plant in order to satisfy the need of mankind for plant materials", and proceeding to the necessity not only for analysis of all the vital processes occurring in the plant but also the presentation of the whole life of the plant as a united organism. To fulfil these needs the material of the book has been arranged as nearly as possible on the basis of the life of the plant. The first two chapters are introductory and deal with the physico-chemical organization of the plant and the chemical composition of plants and their basic metabolism. The next two chapters deal with the more important vital functions which are clearly manifested even in the first growth stages, namely respiration and growth. There follow five chapters dealing with the activities of the vegetative phase of plant life, carbon assimilation, nitrogen assimilation, absorption of mineral elements, water relations and translocation. The remaining chapters discuss the plant "as a unit organism in which all the parts and all the processes taking place in them are closely interrelated". The chapter headings are: X. Resistance of plants to unfavourable environmental conditions; XI. Interrelations between different parts of the plant. Vegetative propagation; XII. Physiology of the development of plants; XIII. Physiological processes during flowering and ripening of fruits and seeds; XIV. Seasonal phenomena in the life of plants.

The book has been compiled with the needs of agricultural students particularly in mind and this is reflected not only in the plan of the book but also in the frequent references to practical experience and in the incorporation of material which is not often found in text-books of plant physiology. From this point of view it is to be cordially recommended. Of the English text-books on plant physiology now available this is probably the most suitable for plant breeders. Another feature, for which thanks are due to the editors is the provision of extensive bibliographies at the end of each chapter; these have been largely selected from books and papers published in English. An index is provided.

J. L. F.

581.145.1:581.46

576.312:575.1

575:633

JONES, S. G.

**Introduction to floral mechanism.**

Blackie and Son, Ltd., London and Glasgow 1939 : 10s. 0d. Pp. xi + 274.

71 figs. 6 tables.

This commendable book, designed primarily for first-year university students, covers a much wider range of subject-matter than is suggested by the title. It is divided into two parts, the first of which is a text book of an unusual character designed for reading and study concurrently with a laboratory course, which is outlined in the second part.

The first part of the book deals with floral morphology and development and is illustrated by an excellent series of original drawings. The unusual feature is that the study of development includes an account of somatic cell division and of the development of the germ cells and is



therefore an introduction to cytology as well as to floral anatomy and ontogeny. The account given of meiosis and mitosis is unusually free from unnecessary complications and the enumerations of obsolete or unnecessary terms that are usually inflicted upon the beginner in cytology are conspicuous by their absence, although the terms heterotype and homotype are retained for the first and second meiotic divisions.

The author goes on from this description of nuclear division to deal with its genetic implications and deals in a lucid way with Mendel's laws and with genetic linkage, relating them to their cytological bases. Polyploidy and its significance are also discussed. Then, in a further chapter, the methods used by the plant breeder are outlined, as an example of the practical utilization of the genetic principles laid down earlier. This chapter, though interesting, is the weak point of an otherwise good book. The kinds of problem which face the breeder are outlined and some of the devices he employs to overcome them are described, but the basic principles of his work are barely hinted at. The significance of single plant selection as opposed to mass selection and the essential differences between the breeding methods adopted for cross-fertilized crops and such self-pollinated crops as oats are only vaguely suggested. The method of crossing pure lines of maize to regain vigour is mentioned, but the reasons for this procedure are left to the reader's imagination and he is not even told that the farmer only uses  $F_1$  or "double-cross" seed and buys fresh seed each year.

Too much attention need not be paid, however, to the deficiencies of a single chapter in an otherwise well-written text.

The second part of the book is primarily for use in the laboratory and contains descriptions of the floral morphology of easily available type plants from a wide range of important families. These descriptions are accompanied by excellent original drawings.

KAINS, M. G. and

MCQUESTEN, L. M.

581.16

**Propagation of plants. A complete guide for professional and amateur growers of plants by seeds, layers, grafting and budding, with chapters on nursery and greenhouse management.**

Orange Judd Publishing Company, Inc., New York 1938: \$3.50.

Pp. x + 555. 335 figs. 31 tables.

It is often very important that the plant breeder should know the most suitable way of vegetatively propagating any new crop with which he has to deal, and as a practical handbook on the subject this book should be of considerable use to him. All the important methods used for vegetative propagation are discussed and each chapter is well illustrated with drawings and diagrams which will make clear many of the practical details.

Chapters that will be of particular interest to the breeder are those on cuttings, which are supplemented by a chapter on the use of growth-regulating substances for the induction of root growth, and those on grafting. The latter include, besides descriptions of the various kinds of grafting, interesting sections dealing with the problems of the compatibility and mutual influence of stock and scion and with the various types of stock used for grafting the more important fruit trees.

In addition to dealing with methods of vegetative propagation, reproduction by seed is discussed and there are chapters dealing with the more general aspects of nursery management. The book is one in which an excellent balance is maintained between purely practical descriptions of methods and expositions of the underlying theory necessary for their proper understanding and intelligent application.

HAYWARD, H. E.

581.8:633

**The structure of economic plants.**

The Macmillan Company, London, and New York 1938: 22s. 0d.

Pp. x + 674. 340 figs.

In this book detailed accounts are given of the structure and developmental anatomy of the following sixteen important crop plants selected from a wide range of families: maize, wheat, onions, hemp, beet, radish, lucerne, pea, flax, cotton, celery, sweet potato, potato, tomato, squash and lettuce. Each chapter is well illustrated, partly with original drawings but

chiefly with the drawings of the many authors whose work has been drawn upon in the compilation of the descriptions. The latter are detailed and logically arranged and each chapter is accompanied by a bibliography of important references. There are in addition, four introductory general chapters dealing with the development of cells and tissues and with the anatomy and development of roots, shoots, flowers and fruit. At the end of the book there is a useful glossary of terms and an index.

WORMALD, H.

632:634(41 + 42)

632:633.79(41 + 42)

**Diseases of fruits and hops.**

Crosby Lockwood and Son, Ltd., London 1939 : 17s. 6d. Pp. 290. 24 figs. 40 pls.

This book is not a learned scientific treatise on plant pathology, but is an attempt to describe the important diseases of fruit and hops in Britain in language that is intelligible to the grower. As such, it is an eminent success. There are two introductory chapters on plant diseases in general and their control, followed by a chapter on certain diseases which affect a range of host plants. After that, each crop is dealt with in turn, their important diseases described and methods given for their control. The descriptions deal mainly with symptoms and are supplemented by excellent photographs. Descriptions of the causal organisms are brief and intended only to make the control measures intelligible or, in some cases, to aid in the identification of the disease with a hand lens. In a final chapter some serious fruit diseases not yet recorded in Britain are described, in the hope that such descriptions will aid in the early detection of any outbreak which may in the future occur.

MIÈGE, E.

633(64)

Les cultures complémentaires au Maroc. . (**The supplementary crops in Morocco**).

Serv. Agric. Colon., Maroc 1938 : Pp. 333. illus.

Neglecting cereals, forage plants, fruits and vegetables, this work covers all other plants of economic importance grown in Morocco. Experimental matter is not included but in each case the plant is described and notes on its cultivation are given.

The amount of information varies with the importance of the crop described; in some cases varieties are described and the figures for their distribution and production are given. The plants are grouped alphabetically under the following headings:—oil plants, textile plants, leguminous seed plants, sugar plants, aromatic plants and condiments, tobacco, roots and tubers, medicinal plants, plants for perfume, tannin plants, pigment plants and plants producing gums and latex. A certain number of the plants are illustrated by photographs.

FLAKSBERGER, K. A. (Editor).

633.1:582

(**Key to the cereals proper—wheat, rye, barley, oats**).

All-Union Lenin Acad. Agric. Sci., Inst. Pl. Ind., Moscow and Leningrad 1939 : 4th ed. 7 roubles, 30 kopeks. Pp. 416. 120 figs.

In compiling this work the aim has been to present in conveniently portable form a concise survey of all the various known species of cultivated wheat, rye, barley and oats.

In carrying out this task the editor, who has contributed the introductory portion of the manual and also the very extensive section on wheats (pp. 11–236), has had the collaboration of V. I. and V. F. Antropov for the section on rye (pp. 237–279), of F. Kh. Bakhteev for the section on barley (pp. 280–348) and of A. I. Mordvinkina for the chapter on oats (pp. 349–413). Descriptions are given of species, sub-species, proles, collective groups of botanical varieties (composing a unit termed by Flaksberger "grex") and also individual botanical varieties. Some wild species have also been included.

As regards varieties the present work purports to present a short key for the determination of the most important botanical varieties in the U.S.S.R.

Economic characters of species and botanical varieties are recorded in certain instances. For full descriptions of agricultural varieties, however, the handbooks for use in the certification of varieties are recommended.

Numerous illustrations of various types and botanical characteristics of the four crops are given and for the assistance of non-Russian users of the key a list of botanical terms is given with equivalents in Russian, Latin, German, French and English. An index of abbreviations used and a detailed table of contents completes this practical and well-produced manual.

PELSHENKE, P. 633.11:664.641.016:578.08  
 Untersuchungsmethoden für Brotgetreide, Mehl und Brot. (**Research  
 methods for bread cereals, flour and bread**).

Moritz Schäfer, Leipzig 1938 : Pp. viii + 288. 39 tables.

In this book has been assembled a comprehensive collection of methods for the investigation of bread-making in all its stages from the grain to the finished product. It is intended, the author states in his introduction, to give the beginner a general survey of the research methods of this very specialized subject and also to be a book of reference for the cereal chemist and the expert requiring information on the rarer methods of investigation.

LAUFER, B. 633.491  
**The American plant migration. Part I: The potato.**  
 Field Mus. Publ., Anthrop. Ser. 1938 : 28 (Publ. 418) : Pp. 132. 6 figs.  
 (Chicago \$1.50).

The potato, ill-fated plant, has been branded as lacking biblical authority, causing leprosy, spreading poison and disease, ruining the soil, causing famines and even as being a contributory cause of the world war. It has also conferred untold blessings upon suffering humanity. These considerations led the late Dr Laufer to make a close study of the history of the potato, which study was left incomplete at his death but has been brought into a form suitable for publication by Mr C. Martin Wilbur. In so doing Mr Wilbur has added footnotes referring briefly to the recent work of the Russian investigators and so enhanced the value of this account of the history of potato cultivation in South America and of its introduction into Europe and other countries, which nevertheless suffers from having been compiled before the appearance of the more precise researches of Salaman and others on this controversial subject. The later development of potato cultivation in the different countries is described from the early texts, charming extracts of which are reproduced. The monograph terminates with a bibliography which includes a number of Chinese and Japanese works.

DUCOMET, V.,  
 FOEX, E. and  
 ALABOUVETTE, L. 633.491-2-1.521.6:575.42  
 Les maladies de la pomme de terre. (**The diseases of the potato**).  
 Défense Sanitaire des Végétaux, Minist. Agric., Paris 1935 : Pp. 40. 20 pls.

The principal diseases of the potato are described and illustrated. Resistant varieties are indicated in some cases and brief notes are given on the methods of mass and individual selection.

633.854.56:575  
**The tung oil trees (*Aleurites*) and the tung oil industry throughout  
 the world.**  
 International Institute of Agriculture, Rome 1938 : 20 Lire : Pp. x + 237.  
 70 tables + figs.

In this monograph descriptions are given of *A. Fordii*, Hemsl.; *A. montana*, Wilson; *A. cordata*, Stend.; *A. moluccana*, Willd. and *A. trisperma*, Blanco. and plant breeders will be interested in the details given in the brief sections on variation and selection.

The flowers of *Aleurites* are usually self-fertilized but natural cross-fertilization also frequently occurs. The variations noted include differences in yield, in oil content, size of tree and resistance to cold.

Russian workers have successfully crossed *A. Fordii* and *A. cordata* and improvement is therefore to be looked for by means of selection and by hybridization and subsequent propagation by grafting on seedlings.

Three varieties, the Craig, Moore and Florida are described.



The rest of the monograph is concerned with details of cultivation and of the distribution of *Aleurites* throughout the world, for which the information has been mainly compiled from the answers to an extensive questionnaire issued by the Section of Tropical Agriculture of the Bureau of Agricultural Science of the International Institute of Agriculture.

PEDERSEN, A. 634.11(48.9)  
 Danmarks Frugtsorter. I. Aebler. (**Danish fruit varieties. I. Apples**).  
 Gartnerforenings Bogforlag, København 1938 : Hefte 2 : 65-128. illus.

The second number of volume I of this work on Danish varieties of fruit (Cf. "Plant Breeding Abstracts", Vol. IX, p. 149) contains descriptions and illustrations of a further sixteen varieties of apples.

TOLKOWSKY, S. 634.3  
**Hesperides. A history of the culture and use of citrus fruits.**  
 John Bale, Sons and Curnow, Ltd., London 1938 : 21s. 0d. Pp. xx + 371.  
 10 figs. 113 pls. 5 tables.

In 1946 it will be three hundred years since Giovanni Battista Ferrari, a learned Jesuit priest and botanist of Sienna, published in Rome his monumental treatise entitled *Hesperides sive De Malorum Aureorum Cultura et Usu Libri Quatuor* (Hesperides, or Four Books on the Culture and Use of the Golden Apples). The author of the present work felt it fitting therefore to repeat the title, though the funds of knowledge available to him have been greater than those to which the earlier scholar had access. Oranges, lemons, citrons and grape fruit are found mentioned in the literature of different nations for the last three thousand years. In early writings however no clear distinction was made between them and the word *kitron* in Greek, *citrus* in Latin, *etrog* in Hebrew and Aramaic and *otruj* in Arabic have been used indiscriminately to designate any member of the citrus group, just as have *chü* in Chinese and *lemo* in Malay. This fact has been overlooked by most previous authors, who have been led therefore to many false conclusions. The author of the present volume has avoided this error and has at the same time tapped a very fertile new source of information, the evidence of the fine arts, painting and sculpture, which have furnished much illuminating information and incidentally provided the material for a great number of delightful reproductions, which greatly add to the charm of the volume.

The very earliest mention of citrus fruits occurs in the *Shu-king*, popularly known as the "Book of History"; it is a collection of old documents brought together and edited, it is believed, by Confucius himself, around 500 B.C.; the oldest documents contained in this collection date back to the twenty-fourth, the youngest to the eighth century B.C. The author gives an account of the early Chinese books on orange cultivation, with delightful extracts and quotations, and of its gradual spread from its natural home into neighbouring lands.

India, the home of the citron, lemon and lime, provides us with the oldest citrus name on record, *jambila*, found in a collection of devotional texts forming part of the Brahmin sacred book called the White Yajur-veda; and the Sanskrit name *nāranga*, found in the oldest existing medical work in Sanskrit, has furnished the series of names that by evolution through Persian and Arabic (*nāranj*), Spanish (*naranja*), Italian and French has ultimately provided the English speaking world with the popular name, orange.

The later chapters are devoted to the penetration of citrus fruits into more distant countries; it is shown that they were known to the early Greeks and Romans; that one of the first observations of sex in plants was made by Theophrastes in relation to the citrus tree, of which he says "of the flowers, those which have, as it were, a distaff projecting in the middle are fertile, while those that have it not are infertile;" that the *peri ets hadar* of Leviticus was not a citron but a cedar cone; that the apples of the Hesperides were originally depicted as quinces, which during the second century A.D. gave place to citrus fruits; that the names citron and citrus arose from confusion with the cedar; these and many other curious facts emerge from the perusal of these pages, which are filled with quaint details and curious speculations and cannot fail to be a source of fascination to all those interested in the evolution of human culture or of horticultural plants or their interrelations. The book is very fully documented and terminates with a bibliography of over 25 pages and an index.

634.8(42)  
634.25(42)  
634.256(42)  
635.611(42)

LANSDELL, J.

**Grapes, peaches, nectarines and melons.**

W. H. and L. Collingridge, Ltd., London 1938 : (revised and modernised by A. J. Macself) : 5s. 0d. Pp. 144. illus.

This little book gives an account for gardeners of the cultivation of vines, peaches, nectarines and melons in England. The major part of the book is devoted to the vines. Brief descriptive lists of varieties of vines, peaches and nectarines are given, a few of the grape varieties being illustrated by photographs of bunches. In the case of melons more importance is attached to strain than to variety. The pollination of melon flowers is described. J. L. F.

BOERNER, F.

634.97

Laubgehölze, Rosen und Nadelgehölze. Ein Lehr- und Nachschlagewerk für die Praxis. (**Woody angiosperms, roses and conifers. A text book and reference book for practical use**).

Heinrich Killinger, Nordhausen am Harz 1938 : RM. 29.† Pp. xvi + 642. 446 figs. 8 pls.

The first three sections are devoted to general considerations, the uses to which plants can be put and the cultivation of ornamental trees and shrubs. Notes on the breeding of new forms are included as well as general remarks on nomenclature and the meaning of some commonly used botanical terms. Part four occupies the greater part of the book and consists of descriptions and illustrations of species and varieties of woody plants growing in Germany, arranged according to their botanical families, within the three main divisions indicated by the title. Indications are given for the propagation of the species and for their general cultivation.

Part five gives the characteristics of the plants in winter, in part six an account is given of the diseases and pests of deciduous and coniferous trees by P. Pauck and part seven gives a table of the abbreviations and symbols used and a glossary of the foreign words.

The book is illustrated by a large number of excellent photographs and some good coloured plates.

The section on roses written by Dr H. von Rathlef includes tabulated descriptions of 478 species and varieties.

ZANDER, R. and

HECKEL, M.

635:030.8

Wörterbuch der gärtnerischen Fachausdrücke in vier Sprachen. (**Dictionary of horticultural terms in four languages**).

12. Internationalen Gartenbaukongress, Berlin 1938 : RM. 5.† Pp. 419.

This dictionary is intended as a vehicle for the interchange of ideas on practical horticulture and for use in the perusal of the relevant technical literature in English, French, German and Italian.

Unfortunately, and indeed much to the reviewer's surprise in view of the excellence of Dr Zander's previous botanical dictionary in German, errors, misuses and misprints are numerous. The English section alone contains the following terms which are not in use (though in some instances admittedly indicating the meaning of the corresponding foreign words) or in some cases wrongly spelt or inadmissibly compounded: Treeprop, own-rooted, four-fruit-jam, flowers sun-loving plants, sweet-cherry juice, tinplate can. The word "vine" is translated "vin", "vino" and "Wein", all three of which mean "wine".

In spite of such serious defects, which render the dictionary a dangerous source of information for the non-linguist, much valuable material has been collected which could be used by the horticulturist in reading foreign publications and by the technical expert who is also a linguist and could therefore in many cases derive the correct terminology from any inadequate translations provided in this dictionary.

Some excellent translations also appear in the various sections and a thorough revision of the book in collaboration with experts with the requisite knowledge of both horticulture and languages might well result in the production of an extremely valuable reference book.

HASSIB, M.

**Cucurbitaceae in Egypt.**

635.61/3(62)

Publ. Fouad I univ. Fac. Sci., Cairo 1938 : No. 3 : Pp. x + 173.

This publication contains botanical descriptions of the various members of the Cucurbitaceae found growing either wild or cultivated in Egypt and should serve a very useful purpose. A full list of botanical synonyms is given for each type, together with the usual Arabic names. In addition, there are keys for the identification of specimens, which wherever possible go as far as the agricultural varieties.

The book is illustrated with line drawings and photographs and contains an adequate index as well as an alphabetical list of Arabic names.

MATAGRIN, A.

635.655

Le soja et les industries du soja. Produits alimentaires. Huile de soja. Lécithine végétale. Caséine végétale. (**The soya bean and soya industries. Food products. Soya oil. Vegetable lecithin. Vegetable casein**).

Gauthier-Villars, Paris 1939 : 60 fr. Pp. x + 390. 46 figs.

The greater part of this book is devoted to the chemistry of the soya bean and its utilization in industry but the first two chapters will be of interest to the plant breeder and agriculturalist. In the first, the history of the cultivation of the soya bean and its introduction into North America and Europe is told. The second chapter gives a brief summary of the plant breeding work that has been done on the crop and a list of the important cultivated varieties with brief descriptions of their major characteristics. There is also a description of the cultural requirements of the crop and of methods of inoculating it with nodule bacteria.

## NEW JOURNALS

**Palestine Journal of Botany (Jerusalem Series).**

The "Palestine Journal of Botany and Horticultural Science," which was founded in 1935, is now being continued in a similar general form as the "Palestine Journal of Botany" (Rehovot Series), two issues of which will appear each year. In addition, a new journal, the "Palestine Journal of Botany" (Jerusalem Series), has now appeared, edited by the staff of the botany department of the Hebrew University of Jerusalem. Four issues of the new journal will appear annually. The general aim is to publish articles relating to regional botanical researches in the Near East countries in the Jerusalem Series, reserving the Rehovot series for articles of a wider scope and covering the whole field of pure and applied botany. This division has not, however, been rigidly adhered to in the first volume of each journal, there being a certain amount of overlapping in the nature of the subject-matter in each direction. The first issues of each journal contain articles in English and French (chiefly the former), each with a summary in Hebrew.

(Published by Department of Botany, Hebrew University, Jerusalem, Palestine. Subscription 18s. per annum, post free; single number 6s., double number 12s.; payable to the Administration of the "Palestine Journal of Botany," P.O.B. 620, Jerusalem, Palestine).

**Chromosoma**

The "Zeitschrift für Zellforschung und mikroskopische Anatomie" has now been divided into two series, Abteilungen A and B, of which this, the second, is entitled "Chromosoma. Zeitschrift für Zellkern- und Chromosomenforschung". It is to be entirely devoted to nuclear cytology, including papers dealing with the chemical or physical constitution of the nucleus or chromosomes and genetical papers in so far as they are concerned with the mechanical basis of heredity. Manuscripts for publication in this journal should be sent to Dr H. Bauer, Berlin-Dahlem, Kaiser Wilhelm-Institut für Biologie, Boltzmannstr. 3/5.

It is unfortunate that the price of the journal is exceedingly high (RM. 27.60 for the first number of 156 pages) and we fear that few private individuals and relatively few libraries will be able to take it. (Published by Julius Springer, Berlin. Price RM. 27.60, Vol. I, No. 1).



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